FOOD MANUFACTURE

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Copenhagen Conference

TO write of Copenhagen before the issue of the FAO Conference has been decided, leaves the reader with the advantage of time. But this much let us say. If we are to have a World Food Board for the disposal of surplus farm products, then obviously the sooner the better. Once we have agreed that it is a paying proposition, we might as well agree to make the administrative changes that are required and share the dividends. But it has never been quite clear in Copenhagen whether the emphasis should be on the 1947 harvest or, more vaguely, on 1949 or 1950 and the years that follow. The distinction is important. Everyone admits that the crop year 1946-47 is going to be a fairly tight one; reserves are low, and there will be at the best a considerable margin between the demand of the deficit countries and the exportable surpluses from overseas. To have yet a third year haunted by famine in 1947-48 would drive the world to the verge of distraction.

The argument for getting a record harvest in 1947, whatever we have to pay for it, appears to be an overwhelming one. But if so, we have to decide quickly. Price schedules have to be fixed, quotas established, and the winter wheat sown. It is probably true that, unless the overseas farmers are sure that they will not be penalised for a bumper harvest, we shall not get that harvest. Still less shall we be likely to get it if we tell them the tale of the World Food Board (as we have already done) and then inform them that after all it was only a dream.

On the other hand, of course, if we are prepared to take chances with the 1947 harvest, then the nations can settle down for the next year or so to discuss the terms of an acceptable World Food Board. There are, however, a few further comments that seem worth making. In one of their smaller documents Sir John Boyd Orr and his colleagues implied that, in their opinion, if the nations could not co-operate about food, they could co-operate about nothing, and that it was a race between a food plan and the atomic bomb. These are dangerous and exaggerated words, such as should not have been issued from an international organisation. We might, for instance, get a series of partial or regional Food Boards, which will later gradually fuse into a workable scheme. It might be less than we could have hoped, but it would not spell disaster. Suppose the U.S.A. were not prepared to guarantee her farmers against a surplus of wheat or maize; is that any reason why the British and Canadian Governments should not agree together to dispose of any unmarketable surplus that appeared on the Canadian wheat belt?

Indeed, there may be much to be said for a regional pattern in farming reform, at all events for the present. The recommendations for the reform of Greek farming economy, submitted by the team of experts from FAO, are evidence that modern science can work quickly and efficiently, where it is given the chance. The report should be studied with attention. But let us admit frankly that the bleakness of the political climate today may make Yugoslavia or Poland unwilling to accept a similar team of experts, mainly perhaps from the British and American research stations; they might imply that they prefer a few assorted French and Russian experts of their own choosing.

In brief, it seems that FAO is not preserving its scientific calm as steadily as it might. It is a scientific instrument in a world that has still to learn how to use scientific instruments for its own benefit. So much may be said of Copenhagen, until there has been time to digest in detail both the reports issued and the outcome of the Conference.

Heat Treatment of Ice Cream Mix

Draft regulations for the compulsory heat treatment of ice cream mix have been framed by the Ministry of Health and are under discussion with the local health authorities, the trade organisations, and the equipment manufacturers.

The Ministry wish to introduce statutory regu-

lations with the minimum delay; but that does not necessarily mean that heat treatment will be made obligatory before processing plant is available to all ice cream makers. Trade circles believe that the shortage of plant, particularly for cooling the mix after heat treatment, will not be readily obtainable for about two years. Any attempt by the Ministry to introduce regulations before traders can possibly comply with them would be strenuously opposed by the "small men's" organisation, the Ice Cream Alliance.

The draft regulations propose to exempt "complete cold mix powder" from the scope of the regulations. In all other cases (and they include ordinary cold mix process ice cream powders) the mix must not be kept for more than an hour in liquid form at a temperature exceeding 45° F. before heat treatment.

Processing must be carried out either (*a*) at not less than 150° F. for 30 minutes; or (*b*) at not less than 160° F. for 10 minutes. After heat treatment the mix must be cooled to not more than 45° F. within 90 minutes and kept at such temperature until frozen. Finished ice cream must be stored at not more than 28° F. at all times until sold by retail.

"Complete cold mix powder" is defined in the draft as a powder made by evaporating a liquid mix which has already been submitted to heat treatment similar to that described above. It must be despatched in air-tight containers and requires only the addition of potable water before manufacture into ice cream.

Although no definite ruling can be given, it seems that the Ministry's intention is that if the ice cream manufacturer adds, say, extra sugar to the "complete cold mix powder," or adds milk or a mixture of milk and water instead of water alone, the mix must be heat treated before freezing.

The definition of ingredients does not include colouring, flavouring, fruit, nuts, chocolate, and similar substances; the addition of these to a "complete cold mix powder" will not make heat treatment compulsory. Mixes prepared with "complete cold mix powder" must be frozen within one hour of reconstitution.

Gelatine Supplies

Some observations on the control of gelatine as an amelioration of the extreme shortness of supplies for manufacturing purposes were made at a recent meeting of the Pork and Small Bacon Curers' Section of the National Federation of Meat Traders' Associations. One speaker felt that the danger of control was the tendency for a thing to disappear altogether when controlled, and this is what would happen if gelatine were controlled, apart from the great difficulties attaching to the subject. It had been suggested that the different grades should be guaranteed, but how could gelatine be graded? If it were graded according to setting ability, it might be found that a good setting gelatine would be useless on account of colour and taste, and these were two things impossible to grade.

Another difficulty was the question of price. A speaker said that he believed that gelatine was now being obtained from Belgium, and if the price were pegged down it might be that we should not get these imports. Already, it was reported, there were signs of an easing in the situation, and it was felt that nothing should be done which might curb this improvement.

Milk Products

For the first time since the outbreak of war statistics are available of the gallonages of milk manufactured into the various products in England and Wales.

The figures show that milk powder alone has made progress during the war, the gallonage of milk used for this purpose in 1944-45 being nearly three times the pre-war average. At the close of the war the gallonage of milk manufactured into butter was less than a quarter of the pre-war average; the gallonage converted into cheese has been halved; for condensed milk it has fallen by 60 per cent.; while the manufacture of cream, which before the war absorbed more than 56,000,000 gallons a year, ceased in 1940.

Milk powder was increasing in importance before the war, one reason for its popularity being that the spray-dried product is believed by many authorities to be the nearest approach to liquid milk in flavour and food value. In order to save shipping space the Government decided during the war to produce spray-dried whole-milk powder for the Services. This explains to a large extent why the quantity of milk converted to powder in England and Wales rose from the pre-war level of 13,100,000 gallons a year to 38,080,000 gallons in 1944-45. Peace-time demand may be for more powder from skimmed milk and less from full cream milk, but the total demand is expected to exceed the war-time level.

Although the total tonnage of milk used for manufacturing purposes has increased every year

since 1941-42, the gallonage used for butter has declined. In 1944-45 only 21,940,000 gallons were so used; the pre-war average was 93,150,000 gallons.

Cheese absorbed 40,430,000 gallons in 1944-45 compared with an average of 81,430,000 gallons from 1936-39. Practically all the cheese is now made in factories, farmhouse production being very small.

Condensed milk absorbed only 30,500,000 gallons in 1944-45, the smallest quantity since 1940-41, when 27,410,000 gallons were used. The pre-war average was 74,700,000 gallons, and in the first year of the war 82,570,000 gallons were absorbed for the purpose.

Post-war trends cannot yet be clearly discerned, but many authorities believe that butter is not likely to attain its pre-war position for a number of years. Early resumption of cream manufacture is considered improbable.

Artificial Sunlight Treatment in Industry

The results of a large-scale and controlled enquiry carried out by Dr. Dora Colebrook and published as an Industrial Health Research Board Report (No. 89) by H.M.S.O. do not confirm the claim that the commonly accepted technique for the irradiation of factory, mine, and office workers with artificial sunlight is effective in reducing sickness and accident incidence and in increasing efficiency. Trials were made in three separate communities, (1) the clerical staff of various departments in the Admiralty, (2) workers in a large factory making tanks and lorries, and (3) those working above and below ground in a Yorkshire colliery. In each of these communities, volunteers were allocated at random to one of four groups. The first received the full range of ultra-violet rays. The second and third groups were irradiated with lamps which had been fitted with screens to cut off the shorter ultra-violet rays—those with a wavelength of less than 3,300 A.U.—which are claimed to be responsible for the tonic effects. Each individual in the second group was given a weekly dose of vitamin D as 3,500 international units of calciferol, and those in the first and third groups were given an inert oil as a control. Thus, if there had been any evidence of vitamin D deficiency in the communities treated it would have been possible to decide whether the rays of the unscreened lamps were able to compensate for this. The fourth group received no treatment at all.

The result shows that in none of these communities was the average amount of sickness absence found to be significantly less among those who had ultra-violet light treatment than among those who were exposed only to the screened lamps. In the two communities in which the duration of colds was studied, and in the colliery where injury and total absence were measured, the three treated groups did not differ significantly, nor did any of the communities show any evidence in the characteristics measured, of a vitamin D deficiency.

As a leading article in the *Lancet* points out, a negative result such as this may be less satisfactory to the research worker than a positive one, but that this enquiry will have been fully justified if it serves to illustrate both the method of and the difficulties inherent in carrying out such a carefully controlled and large-scale trial in an industrial population, and it is hoped that it may succeed in diverting the attention of management and workers from what could at best be hardly more than a placebo to the more radical methods of preventing sickness and absenteeism.

The Patents and Designs Act, 1946

Although the life of a patent is ordinarily sixteen years, extensions beyond this period can be obtained, but up to the Patents and Designs Act, 1946, this could only be done through the High Court. An application for an extension is made by (*a*) "petition" or by (*b*) "originating summons," but under (*b*) an application is only accepted where the patentee as such has suffered loss or damage (including loss of opportunity of dealing in or developing his invention owing to his having been engaged on work of national importance) through this country having been at war. But by either of the above methods much expense is incurred, even in clear cases, costs usually running up to £200. The Act under review alters all this; incidentally this measure is based on a Report of a Committee (known as the "Swan" Committee) appointed by the late Coalition Government.

By this new Act, although applications can be made to the court as before, any person qualifying under (*b*) as above (this method is commonly known as the "war losses" provision), can if he chooses merely apply to the Comptroller of Patents for an extension, which authority has power to decide the case without personal appearance of the applicant. But on the other hand if the Comptroller considers there is a point of law involved he can refer the matter to the court for a decision; applicants have right of appeal from any determination of the Comptroller to the Ap-

peal Tribunal (constituted under the Principal Act).

Patent law is somewhat singular, as it applies internationally—that is, in respect of a country subscribing to the Conventions of the International Union for the Protection of Industrial Property—so that if protection is given in one such country (*e.g.* a patent) similar protection can be obtained in any other Convention country. Germany and Japan were such countries, but this Act now denies protection in this country to a German or Japanese national or firm, as regards any invention or design originating from Germany or Japan or enemy-occupied country, between September 3, 1938 (this date to include Austria) and December 31, 1945. Recently, France, Holland, U.S.A., and the U.K. have agreed that any German patent now controlled by either of these Governments is to be available within the respective territories to all nationals of the countries party to this agreement, without payment of royalties and without any requirement to manufacture within the country where the patents exist.

So as to give opportunity for objections to the grant of a patent to be made and to give opportunity generally to see whether the invention meets the rule of being "any manner of new manufacture," on application particulars of the invention are published and are open to public inspection, but of course priority protection is given to the applicant. But if application is abandoned this publication procedure is not followed; by this new Act, however, if any wartime application subsequently abandoned is considered by the Comptroller as having come from a German or Japanese national (or company), publication will be made and the application and specifications, with drawings, samples, representations, and specimens (if any) will be open to public inspection, and so such information will be available to industry generally.

Where information has been divulged before an application for a patent has been entered, in pursuance of any arrangement between different Governments, as for example between the U.S.A. and the U.K., an application subsequently made has priority over any other application, and if through such an arrangement information has been wrongly used by any person so that a patent has been granted, that patent can be revoked and the rightful inventor given proper priority. This provision can apply to applications from another such country if that country has similar legislation (as in U.S.A.)—that is, it applies reciprocally.

Farmed-out Research

A striking development in connexion with post-war scientific research in the United States is the great increase that has taken place in the amount of work "farmed out" by industrial concerns to private research organisations.

The type of research work essential to successful plant operation and the development of new products is not only being used by companies which have neither laboratory facilities nor a scientific staff but even by industrial concerns with extensive research facilities.

This trend is due to the fact that the outside research group offers many inducements for special investigations which can be carried on without interruption in an organisation isolated from production operations.

To a relatively small extent, the system is carried out in this country, but its extension might be well worth the study of those concerned.

Roadside Refreshment

Though the R.A.C. in its scheme now mooted for "Roadside Rests" or pull-ins for the motorist does not visualise the inclusion of *cafés* or tea-gardens, this question of refreshment on the way does need some airing. Our long-distance transport drivers have their requirements fully met, not so much by the many inns which they "pass" as by the multitude of wayside purveyors of meals or snacks whose premises are listed in the Directory of Road Transport *Cafés*, now in its fourth edition. The lorry driver gets to know his favourites. Whether it is "Old Joe's," "Tom's," "Albert's," whether the "Don *Café*" or the more flashy-sounding "Deauville," he knows just what to expect and is usually satisfied. But the motorist is up a different street. Regarded as a pleasure-seeker though often on business, as a man who can pay, with little tendency to grumble since he is a casual caller, he is lucky when he meets an R.A.C. or A.A. recommended hotel, a Trust House, or other place with some backing. But off the beaten track or out of tea-time hours, too often has he to gamble. Good *cafés* there are; but many a time what should be a welcome sign of "Teas" entices him to a shack in which a lukewarm concentration of tannin in a cracked cup represents what is our national beverage, the mark of an Englishman. Our railway companies put us off in their shortcomings in tea-making, pointing to a safe journey as prime *motif*, but these roadside providers have no such excuse with their one *raison d'être* as caterers.

Stringless beans, after their emergence from the machine which separates them into five different grades, enter the snibbers in which tops and tails are removed.

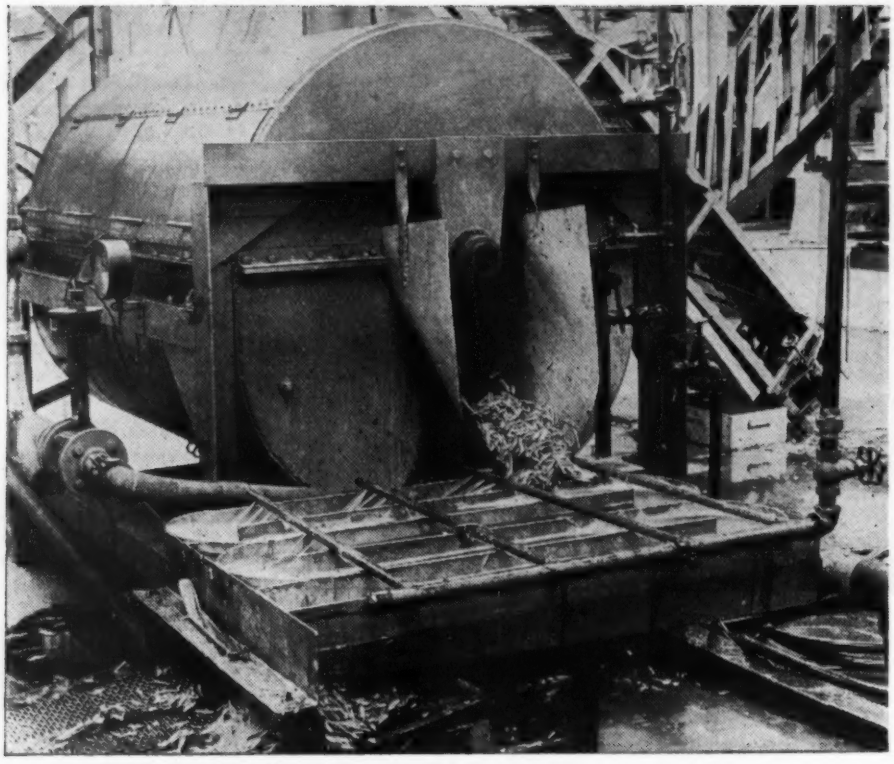
British Quick Freezing Under Way

T. CROSBIE-WALSH, F.R.I.C.

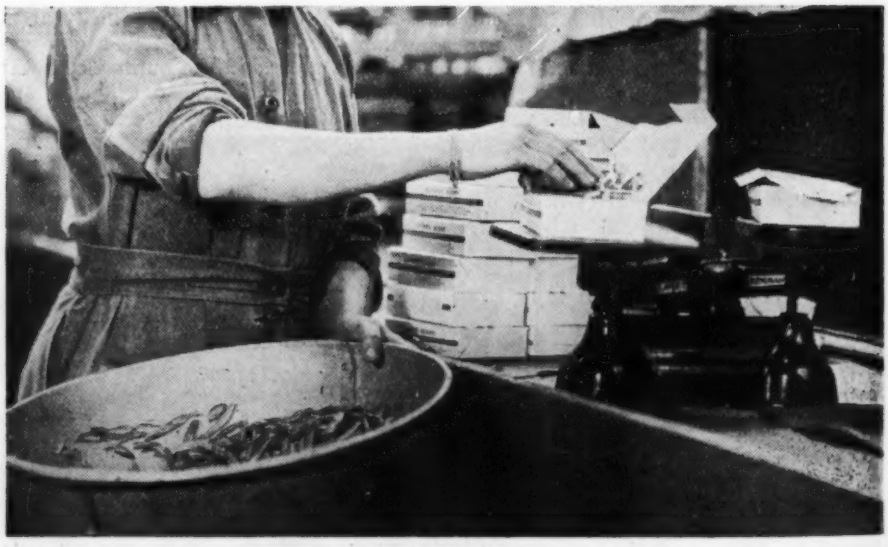
A description of the Wisbech Produce Canners, Ltd., factory at Wisbech, which, in addition to fruit and vegetable canning activities, is building up important quick freezing operations.

SMEDLEY'S have got off to a flying start with British quick freezing. It was in 1935 that they first started a small experimental plant by which they produced 20 tons of quick frozen peas and fruits. The following year a larger plant with a capacity of 10 tons a day was installed. Between 1936 and the outbreak of war over a hundred retailers in England, Wales, and Scotland were sup-

At the other end of the snibbers, showing stringless beans falling on to the inspection tables, where faulty ones are removed.



Beans emerging from the blancher where they are subjected to a short heating process to destroy enzymes, after which they are cooled in ice-cold water.



The packing operation. The nature of stringless beans does not allow them to be packed automatically, and here they are being put into the cartons by hand.

Runner beans being inserted into the slicing machine.

plied with special refrigeration cabinets in which to store and from which to dispense quick frozen goods. The impact of war brought quick freezing to a standstill, and it was only in the spring of this year that operations were resumed.

Apart from the Wisbech factory, the Smedley group have installed plants, embodying the latest methods, at Faversham and Dundee.

Quick Frozen Peas

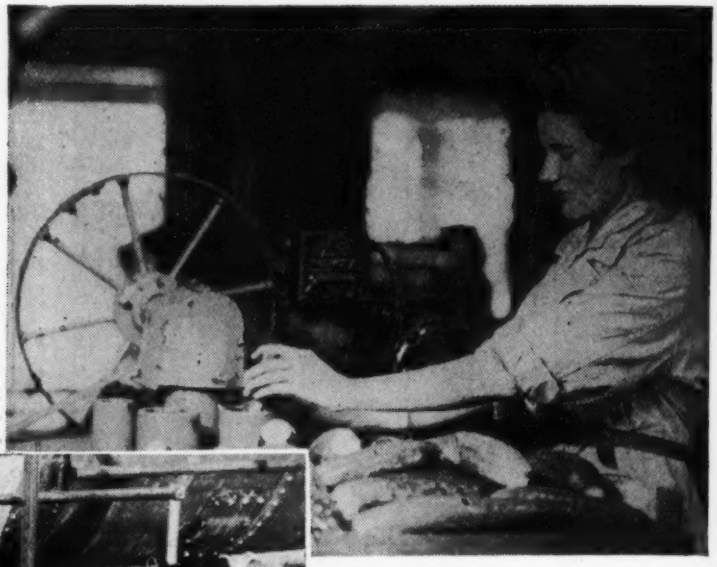
Despite the fact that about six weeks' work had to be concentrated into three, a very successful season has recently been concluded. The Wisbech factory is particularly well placed for the purpose, owing to the organisation already in existence in connexion with pea canning. The factory is surrounded within a radius of three to five miles by eight vining stations, from which are delivered a constant stream of shelled peas ready for quick freezing or canning. At these stations the peas are threshed and delivered to the factory within approximately forty-five minutes.

From the time of arrival of the peas at the factory to the time that they are wrapped in cartons they are handled automatically. They first go into a machine in which scraps of pods and vines are removed by aspirating and riddling, and thence to the washer by conveyor. This washer consists of a rotating riddle fitted with a water spray, from which the peas emerge free from "splits" and husks.

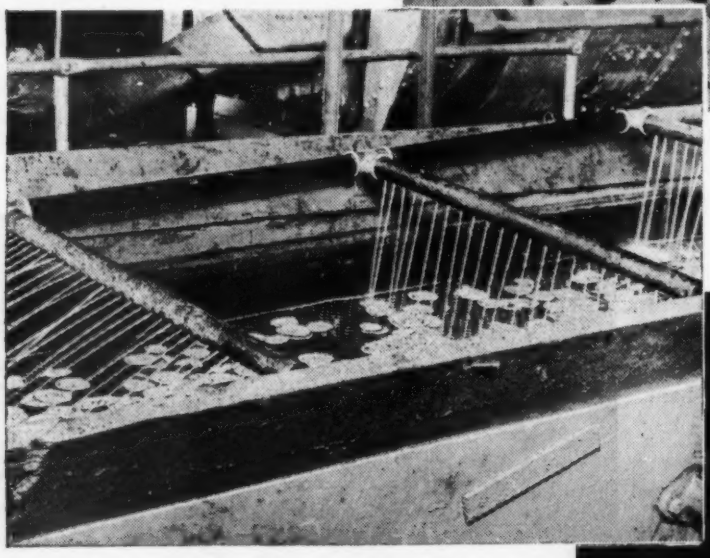
Next follows the blanching operation, in which the peas are subjected to a short heating process (about one and a half minutes) to destroy enzymes, and from the blancher they fall into a tank, in which they are re-cleaned to remove all vestiges of husks and split or damaged peas. This inspection is continued on the picking table along which the peas are conducted by a moving belt.

The peas are next cooled in water at ice-cold temperature and enter a quality grader to separate the younger and older peas. This is done by means of brine flotation, the younger peas floating in a solution of brine and being carried off, while the more mature peas sink to the bottom. After the grading process the peas selected for quick freezing are washed to eliminate the adhering salt solution and are conducted to the filling machine, which inserts the requisite weight of peas into cartons, thence pro-

From the slicing machine the beans fall on to a moving belt, which carries them into a revolving cylindrical sieve, by which small shreds are eliminated.



Washed cucumbers being introduced into the slicing machine (top picture), from which they drop on to a moving belt contained in a trough which is fitted with spraying devices (middle picture).



Filling Cellophane bags with cucumber slices ready for quick freezing.

ceeding to the carton folding machine and finally to the wrapping machine and on to the cooling chamber.

Distribution is effected by means of refrigerated vans. Quick frozen vegetables are packed in 12 oz. cartons and 3 lb. and 12 lb. containers, the 12 oz. carton containing enough for three or four persons.

Stringless Beans

The beans, on arrival at the factory, enter a grading machine, which separates them into five different grades, after which they enter the snibbers, in which the tops and tails are removed. The sequence of operations is approximately the same as for the preparation of peas, although the nature of the material does not lend itself entirely to automatic handling.

The beans are blanched, cooled in ice-cold water, filled, packed, and wrapped, the filling operation being done by hand.

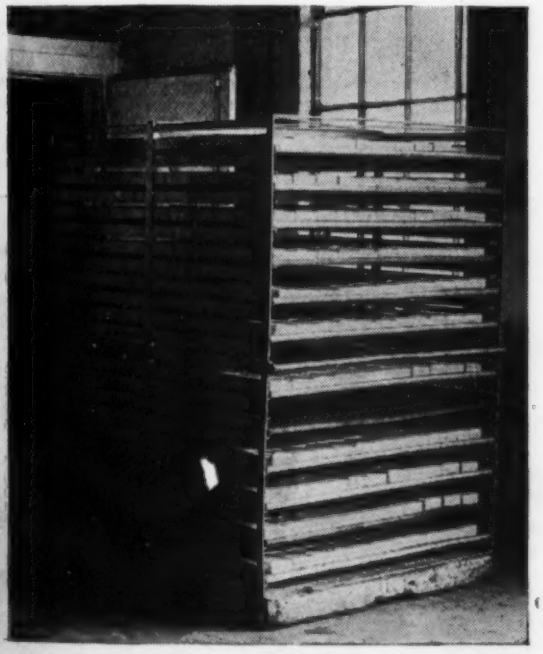
Runner Beans

A slightly different set of operations is involved in the preparation of runner beans. They are stringed, topped, and tailed in the appropriate machines, after which they undergo the slicing operation. The beans are inserted by hand into the slicing machine, and the slices fall on to a moving belt, which carries them into the riddle—a revolving cylindrical sieve—by which the smaller shreds produced during the slicing operation are eliminated. The beans are then conveyed to the blancher, cooled, and packed by hand.

The automatic carton wrapping machine in action.

Cucumbers

A small pilot plant is engaged in the processing of cucumbers for quick freezing. The cucumbers are sliced by machine, from which they are dropped on to a moving belt, on which they are subjected to water spraying. The slices are conveyed to the filling table, where they are packed by hand in Cellophane bags, which are heat-sealed.



A truck laden with cartons about to enter the freezing room.

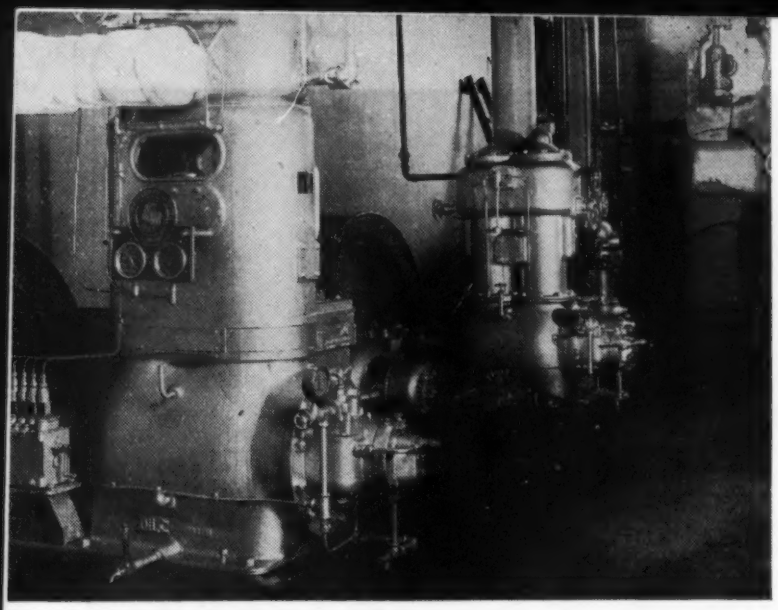
The Freezing Plant

The freezing plant which handles the different products consists of an air-blast tunnel operating at a temperature of −35° F. This tunnel can be used for freezing either packaged or unpackaged products. On emerging from the tunnel, the cartons, packed in cardboard boxes, enter the cold storage chamber, which is maintained at a temperature of 0° F.

Among the vegetables prepared this season have been spinach, asparagus, broad beans, runner beans, French beans, peas, garden mint, cucumbers, and tomatoes. In normal times the soft fruits — strawberries, blackberries, raspberries, rhubarb, currants, etc.—are quick frozen, but owing to present prohibitions these have not been handled. However, a good production of quick frozen plums has been possible.

American Visit

In an interview with Mr. W. V. Smedley, managing director of the company, he said that he had recently spent two months in the United States, during which he investigated every angle of quick freezing, including American sales organisation, technical and processing methods, and methods of cultivation of the different crops. He



A partial view of the refrigeration plant showing the compressor in the background.

also made a round of the Government research stations.

Asked why American quick freezing was so much in advance of our own, Mr. Smedley said that he attributed this largely to the support which the American Government had given to processors during the war, the main object of which was the saving of tin-plate. With regard to freezing methods, America's output was quantitatively far and away above ours, though none of their existing applications of refrigeration in commercial use at present differed greatly from those employed here.

Asked his opinion as to the possibility of the ousting of canned foods by quick frozen foods, Mr. Smedley said that he had discussed this with many heads of the industry in America, and they shared his opinion that in the future the consumption of foods would be about equally divided between fresh, canned, and quick frozen.

LIST OF SUPPLIERS TO WISBECH PRODUCE CANNERS' FACTORY

Viners: *Chisholm Ryder Company.*
Automatic Weighing Machines: *W. and T. Avery, Ltd.*
Refrigeration Equipment: *York Shipley, Ltd.*
Bean Slicers: *Mather and Platt, Ltd.*
Pea Plant: *This was modelled on American machines and others by Smedley's engineers in their own works and others were made to their own design in local machine shops.*

The entrance to the air blast tunnel operating at a temperature of −35° F. This tunnel can be used for freezing either packaged or unpackaged products. On emerging from this the cartons, packed in cardboard boxes, enter the cold storage chamber, which is maintained at a temperature of 0° F.

Food Problems in Europe

In the darkest days of the war, when the first stages of food rationing were still something of a novelty in this country, our spirits were often cheered by rumours that our enemies' food supplies were much less adequate than our own. Later on, unfortunately, it became only too obvious that the Germans would not starve while food remained to be rifled from occupied territories, and our own restrictions appeared less irksome only when compared with the privations endured by our allies in enemy hands. The extent of the sufferings borne by our European neighbours during the war, and the acute food problems still to be solved, both on the Continent and in our own country, were discussed at a recent conference of The Nutrition Society. Delegates from numerous European countries were present at the invitation of the British Council.

THE imposition of bread rationing in this country has met with a mixed reception, largely according to the political colour of the consumer. The Government has been praised by its supporters for its high moral principles, and blamed by the opposition for its gullibility and incompetence. Wheat, the mainspring of western civilisation throughout the ages, has ousted the atom bomb as first-page news.

Feast or Famine?

It is not surprising, therefore, that while our food shrinks in quantity and deteriorates in quality it should occupy an increasingly important place in our minds. Some of us may even fear, though let us hope without justification, that within the next few months the pangs of real hunger may supersede the boredom engendered by an unpalatable and monotonous diet. In the meantime travellers' tales of the lands of plenty beyond our borders arouse at once our appetite and our envy. Denmark, we are told, abounds in cream, butter, and bacon. In Dublin we may enjoy real beef steaks, and drown our sorrows in whisky which does not cost its weight in gold. Even Germany, according to some observers, enjoys a Black Market which in organisation and the lavishness of its supplies far excels our own.

Such dreams of feasting, however, must not blind us to the opposite side of the picture. During the war famine was a grim reality in many parts of Europe, and its shadow still remains. It was not out of idle curiosity that Dutchmen found that tulip bulbs were edible, whereas daffodils and narcissi were poisonous. An account of the horrors of starvation in the ghetto of Warsaw was compiled by twenty-three Polish medical men, of whom one still survives. We may feel some perplexity in this country, therefore, in striking a balance between the light and the dark side of the picture. Is our acceptance of a reduced and austere diet to be regarded as a noble and necessary sacrifice on behalf of less fortunate nations? Or is the British housewife being victimised to maintain unnecessarily high standards of nutrition in countries which have not endured six long years of active war effort?

The Scandinavian Zone

The testimony of the delegates who attended the Nutrition Society's conference will be of great value in helping us to answer these crucial questions. Starting our review with those countries which appear to have been well fed, we may reasonably place Denmark at the top of our list. This country normally imports calories, in the form of cereals, and exports animal proteins and fats, in the form of bacon, butter, cheese, and eggs. The shops, according to credible reports, are now glutted with these commodities, which other nations are unable to buy through considerations of price. Bread, which is made of wholemeal rye, is rationed, but the daily allowance of 250 g. for adults on ordinary work does not seem to cause much hardship.

In Sweden extensive dietary surveys by Professor E. L. Abramson have shown that the nutritional state of the population was excellent throughout the war, even though the consumption of meat fell to 75 per cent. of its pre-war level. The bread was wheaten, of 82 per cent. extraction, and enriched with vitamin B_1 and iron. To avoid risk of vitamin A deficiency the margarine supply was fortified with carotene, which was extracted from carrots. The fact that the death rate in Sweden reached its lowest level in 1942 seems to prove beyond doubt that the diet was quite adequate at that time.

The position of Norway under German occupation was much less fortunate. Dr. O. Galtung Hansen has explained that by 1942 luxuries such as coffee, tea, cocoa, eggs, and fruit had completely disappeared. Meat, moreover, was very scarce, and

was replaced by a threefold increase in the consumption of fish. The proportion of the total calorific intake contributed by fat also fell, decreasing from the pre-war level of 40 per cent. to about 20 per cent. In compensation the consumption of bread was increased by 30 per cent. Almost the entire population felt tired, weak, and cold, with constant hunger both before and after meals. Adults lost weight, and children failed to grow. The incidence of infectious diseases in general increased six times, the rate for pneumonia was doubled, and notifications of tuberculosis rose by 34 per cent.

France and Belgium

France is largely an agricultural country, and her troubles both during and after the war have been mainly confined to her large industrial towns. Failure in the distribution of farm products, which was understandable under German occupation, now presents a problem which urgently requires solution. Dr. Trémolières has told how faulty nutrition has been accompanied by increases in tuberculosis and in the neo-natal death rate. He has also reported that while the average vitamin A reserve in France is about the same as in Britain, the distribution between rich and poor members of the population is quite different. The extent of the Black Market in France apparently favours the accumulation of high vitamin A reserves by those who can afford to eat well.

In Belgium the diet, according to Professor E. Bigwood, was at its lowest in 1943, when it contained only about 1,800 Calories, excluding small contributions by milk and green vegetables. Before the war about half the animal protein consumed in this country was produced locally, and deficiency in this direction caused many cases of oedema in the earlier stages of the war. Later on much greater quantities of protein were eaten in the form of herrings from the North Sea and oedema became very rare.

Holland

In Holland, as in our own country, the threat of shortage of food supplies was guarded against by careful planning and research. Professor B. C. P. Jansen told how, at the beginning of the war, a Board of Nutrition was founded, which appointed a so-called "Pulse Committee," whose object was "to keep its finger on the pulse of the nutrition of the people." The Board encouraged the growth of potatoes, which give a high yield of food per acre, and large areas of pasture land were turned over to this crop. In view of the shortage of fruit it was realised that the potato had to be relied upon as the main source of vitamin C, and careful experiments were carried out to find the influence of variety and season on the vitamin C concentration. New potatoes were found to contain much more vitamin C than varieties which were lifted later in the season. In potatoes which were stored throughout the winter the vitamin C concentration fell to a very low level. Bread, which in Holland normally supplies 36 per cent. of the calorific intake, also gave rise to serious problems, since during the war no grain could be imported. A mixture of two parts rye and one part of wheat, with an extraction rate of 85·5 per cent., was standardised as giving bread of good digestibility, and at the same time leaving some bran for animal feeding.

During the early years of the war the reports of the "Pulse Committee" indicated that the incidence of tuberculosis had increased, but the state of nutrition of the people was not acutely deficient. Thus the levels of vitamins A and C in the blood remained unchanged. In 1944, however, the great railway strike, which dealt such a severe blow to the German war effort, was paid for by the Dutch with the full horrors of famine. Later, as a result of the Allied invasion, Western Holland was cut off, and for several weeks the average food intake was only 500 Calories per day. In all, about 20,000 people died from starvation. The spark of life was kept in many others only by such unusual foods as sugar beet roots, tulip bulbs, and in the end parcels dropped by the R.A.F.

Finland and Poland

In Finland the effects of malnutrition were observed by Dr. J. K. Tikka. The war-time diet was quite good until 1941, when the effects of shortage of labour, reduced fertility of the soil, and loss of territory began to be felt. Even under these conditions, however, no hardship was experienced in the country, where plenty of food could be bought from the farmers through the Black Market. In the towns, however, supplies became very short and prices high, so that the position for those with large families and fixed incomes was serious. Inadequate amounts of cereals and potatoes were the main dietary components, with only minute amounts of meat and dairy products, and an acute shortage of fats. Adults lost about 10 per cent. in body weight, and in children the incidence of rickets was much increased.

In regard to Poland, Dr. Szczygiel drew a very black picture. In 1941 the food intake had fallen to only 1,200 Calories, although the Black Market did a patriotic duty in preventing what food it could from falling into enemy hands. Shortage of supplies, moreover, was aggravated by poor quality. The black rye bread, with added bran, was often very sour. Foodstuffs were often contaminated with *salmonella* or *trichomonas*, and diarrhoea was so common that on one occasion every inhabitant in a small village was affected. Scurvy was sometimes so severe as to cause loss of the teeth, and there were more than a million cases of tuberculosis. In the Warsaw ghetto few infants escaped death from starvation, while in the con-

centration camps a food intake for adults of only 500 to 1,000 Calories caused oedema in 75 per cent. of the prisoners. Even now the food supplies of Poland are grossly inadequate, and the neo-natal mortality rate remains at twice the pre-war figure.

The Land of Plenty

In addition to hearing an account of food conditions and of nutritional research in Britain from many leading authorities, including Sir Edward Mellanby and Sir Jack Drummond, the European delegates were told of conditions in America by Professor C. G. King. In his capacity as Scientific Director to the Nutrition Foundation, Inc., the great research organisation promoted by American food manufacturers for the purpose of developing the science of nutrition, this eminent investigator enjoys a key position in supervising and co-ordinating the progress of nutritional research in the U.S.A. As might have been expected, he reported that in spite of the rationing of certain foodstuffs in America there had been practically no evidence of deficiency diseases during the war. At the same time it could not be guaranteed that the standards for the intakes of all the various nutrients as laid down by the National Research Council had been satisfied in all sections of the community.

As a commentary on prevailing dietary standards in America, a brief allusion to Dr. Icie C. Macy's recent experiments on human milk may not be out of place. Groups of mothers in Detroit, from whom milk was to be collected, were given a standardised diet which included liberal amounts of chicken, eggs, liver, spinach, carrots, apricots, butter, cream, and milk. With this admittedly special diet the amounts of the various vitamins in the milk were certainly higher than in milk from mothers who selected their own diet. The differences, however, were usually so small as to suggest that the common diet in America closely approaches perfection, at least in regard to its nutritive value.

It must also be remembered that the standards for the daily requirements of certain nutrients were originally placed by the American National Research Council at such high levels that it was impracticable to satisfy them with any ordinary diet. For these nutrients the so-called "Restricted Standards," taken as 70 per cent. of the original estimate, have recently been adopted. Professor King's reservation that the food intakes of Americans do not always reach the official standards may not, therefore, cause undue anxiety in hungry Europe.

Help for the Hungry

The comparison of food standards in different countries is a notoriously difficult problem. The reports of delegates may be coloured by a desire to paint the gloomiest picture in the hope that relief may be given on a generous scale. Travellers may gain false impressions, since in hotels they may fare either better or worse than in the homes of the people. Even comparisons of official statistics are not always immune from error, since unless great care is taken serious discrepancies may arise from the use of alternative methods in compiling data. Thus values may be quoted for cooked or uncooked foodstuffs, for meat with or without bones, for potatoes with or without their skins.

It seems clear beyond reasonable doubt, however, that all European countries, with the possible exceptions of Denmark, Sweden, and Eire, have at present to subsist on diets which fall far below American standards. Of those countries whose delegates have just visited us Poland appears to be in the sorriest plight. Most other Allied countries have certainly suffered relatively short periods of serious food shortage, such as the acute famine in Holland, but their present position is at least beyond the immediate risk of starvation. Conditions in Italy also cause little concern, but Austrian food supplies are perilously low, particularly in the towns, while the same danger exists in the British zone of Germany. Greece has already felt the full effects of famine, while the food supplies of the Balkan countries are largely obscured by the iron curtain of Russian domination.

To meet these widespread demands for food, to which must be added the distant calls of India, China, and Indonesia, the United Nations have set up several important organisations. UNRRA, which did so much to feed the starving in the days immediately after the war, is shortly to close down. The Combined Food Board has assumed the function of distributing food supplies fairly between nations. FAO, with Sir J. B. Orr as its Director-General, has undertaken the enormous task of planning on an international scale the correlation between agricultural production and nutritional requirements.

The Camel's Back

While the nutrition experts scratch their heads in Washington, what are the thoughts of the long-suffering British housewife, as she stands patiently in the queue clasping her big basket? It is a long time since she has tasted the apricots and cream beloved by her sisters in Detroit, although her 85 per cent. extraction bread is not yet as foul-tasting as the black rye loaf of Poland. Probably amid her perplexities over the intricate interchange of bread coupons and points and her anxieties over tomorrow's dinner and the children's boots it has gradually dawned on her that no beast of burden was ever called upon to carry a heavier load.

How long ago, it seems, were the days when she could pick and choose her food! Bacon was bacon in those happy times, and did not fall in shreds when cut. Margarine which failed to reach the high standards demanded before the war was left unsold on the grocer's counter. Now she must

take what she is given, and be glad to get it. Food must be spared for the starving in other lands. Wheat which would have kept Britain's loaf at its former size and quality must be diverted to France, Holland, Germany, Austria, or to the ever-increasing millions of India. So the housewife must work harder, worry harder, juggle more cleverly with her precious points to keep her own family from feeling hungry.

World Shortage or World Chaos?

How did the present state of alarm over food supplies develop? According to Dr. W. Aykroyd, of FAO, the present wheat shortage arose suddenly when it was calculated that the nations importing wheat required 30,000,000 tons, whereas those exporting wheat had only 20,000,000 tons available. Contributory causes giving rise to shortage have been the devastation of large tracts of arable land by the direct impact of war, shortage of labour and agricultural machinery in war-ridden countries, and poor harvests through adverse weather conditions, particularly the failure of the Indian monsoons.

To complete the story, however, two further points should perhaps be emphasised. Firstly, it must be realised that immense stocks of grain were held in America during the war, which if kept in reserve for direct human consumption would have eliminated all risk of a world-wide shortage of bread. The risk was either imperfectly realised or blandly ignored, and large amounts of grain were diverted to animal feeding. Secondly, since the discovery of the present emergency there seems to have been no adequate attempt, except by financial loans, to equalise the sacrifice to be borne by the various nations. Thus in America food rationing has been abandoned and price limits withdrawn. In many poorer countries, on the other hand, rationing has been retained, and in Britain even intensified.

According to pronouncements published at Hot Springs and elsewhere the aim of the various organisations working under the auspices of the United Nations is to promote a fair distribution of food throughout the world. Now is the time for action, for in the absence of clear guidance and assistance the nations may well be thrown back on their own devices to buy their scanty food supplies in what markets they can find. In Britain we shall still hope that food planning on a world scale will lead eventually to an era of true peace and prosperity, but if all else fails we may at least take comfort in the strength of our own resources. The prairies of Manitoba and the creameries of New Zealand remain within the framework and fellowship of the Empire. Our new long-term agreement with Canada for the supply of wheat brings us the hope not only of unrationed bread, but of a spirit of unity and co-operation in at least one major section of this troubled earth.

White v. Brown Flour

THE relative merits of white and brown flour have been a controversial topic for more than a century. During that period the controversy, of course, passed through many spells of quiescence, but each discovery of new facts relating to the nutritive value of bread, and often an advance in our knowledge of the metabolic functions of nutrients, has led to a revivification of the battle. The fight has at times raged furiously, and it is to be regretted that some of the protagonists of the brown bread school have been so carried away by a fanaticism in their belief that they have entered the lists armed with arguments which have revealed an astounding ignorance or distortion of relevant facts. It is only natural that this controversy has acted as an impetus to research on the nutritional and dietetic values of different types of flour and bread, and, following its promotion to a national issue during the war period, it can claim to have been partially responsible for the noteworthy advances which have been made in our knowledge of the nutritive "make-up" of the wheat kernel and in the technology of flour milling.

During the long course of this controversy the points upon which the two schools of thought have concentrated their arguments have changed with the widening of our knowledge of cereal chemistry and of nutrition. In the early days the question of digestibility was much to the fore; it was argued that the advantage of a higher protein content in brown bread was more than offset by the fact that this protein, and also the accompanying carbohydrate, was less digestible than the same two constituents in white bread. Two other subjects which were debated during this "pre-vitamin period" were the higher mineral content of brown flour and the physical effect of bran upon intestinal action. Following a period of intensive nutritional research during the earlier years of the present century the controversy flared into renewed activity with vitamins as the point at issue, and eventually the significantly higher vitamin B_1 content of brown flour became the main plank of the brown bread adherents. On the other hand, the brown bread school was obliged to give ground in another direction, as it became established that brown flour, unlike white flour, contained an excess of phytic acid and thus immobilised a significant amount of the calcium provided by other ingredients in the diet.

Just prior to the war the British millers decided to remedy the B_1 deficiency of white flour by the addition of synthetic aneurin, and during the war this fortification or enrichment of white flour was also adopted in America; but the supplements incuded riboflavin, nicotinic acid, and iron in addition to B_1. Fortification was discontinued in Britain when the level of extraction was raised to 85 per cent., but by the introduction of revolu-

tionary modifications into the accepted system of milling the British millers were eventually able to reduce the bran content of the 85 per cent. product without loss of B_1 and produce what was, in effect, a near-white flour. These two developments—the introduction of flour fortification and the production of a higher extraction flour which possessed a reasonably high B_1 content without a correspondingly high bran content—have led to a modification of the views of each of the bread schools, and today the main issue is no longer white flour *versus* wholemeal, but rather fortified white flour *versus* high vitamin higher extraction flour of the near-white type.

The aim of Dr. Dunlap's book* is to review the course which this controversy has pursued and to record the arguments and evidence which have been adduced by the two schools during the various phases through which it has passed. The controversy is not, however, followed chronologically, but is surveyed by collecting together the selected information upon various aspects of the problem. The scope of the recorded information can be gauged from the subjects dealt with in the twelve chapters. The first chapter, which is a short one on the kind of bread which our forbears ate, is followed by one on the composition of white and brown flour and bread. This chapter contains a series of useful tables setting out average values for the nutrients contained in various flours and breads. The next chapter deals with mass feeding with long-extraction flours, and this is succeeded by one chapter on the nutritional significance of bran and by two chapters on the nutritional characteristics of white and brown flour. Chapter eight deals with professional views of white *versus* brown flour, and then comes a chapter on biological values. The next chapter is devoted to the phytic acid problem in long-extraction flour, while enriched flour and enriched bread are dealt with in the following chapter. The penultimate chapter records additional views on white and brown flour, while, for full measure, chapter twelve deals with the amino acids in nutrition. How well Dr. Dunlap has covered his subject is revealed by the bibliography; this comprises 336 references, which range in date from 1837 to 1945.

The form in which the subject-matter is presented is unusual, and the book is, in fact, virtually a collection of quotations from the 336 references in the bibliography. The author explains in his preface that this plan has been followed "so as to avoid as far as possible any danger of misunderstanding of the various authors' opinions," but this arrangement, particularly when the quotations are drawn from authors who write in widely different styles, gives the context an irritatingly disconnected character. This may not be of great moment to "cereal chemists and others more or less closely associated with, or interested in, the milling industry and its products," for whom the author states the monograph has been primarily prepared, since they may use the work mainly as a book of reference; but it does lessen the extent to which it will "serve to bring information to others who may desire to know the pros and cons of a subject which has been a lively topic of argument for over a hundred years." This latter type of reader is liable to find this disconnected presentation of the pros and cons not only wearying but somewhat bewildering, and to such readers the book would undoubtedly have an enhanced appeal and value if each chapter were supplemented by a summary of the essential facts and claims of the pro and con quotations of which it was comprised.—A. J. AMOS.

* *White* versus *Brown Flour*. By F. L. Dunlap, Sc.D. Pp. vi+272. London. 21s. net.

Seaweed as Feeding Stuff

SEAWEED, because of its high potash content, is often used as a fertiliser, especially in coastal districts, where large quantities are washed up and the minimum of labour is required for its collection. From time to time, however, dried seaweed is advocated as a food for livestock. There is nothing new in the suggestion, for Norwegian farmers have for generations fed seaweed to livestock.

Results of Norwegian digestion trials made at the Agricultural College of Norway showed that, using meals made from the seaweeds *Laminaria* (drift weed) or *Fucus* (Bladder-wrack), livestock as a whole were able to break down and make use of the peculiar forms of "food" in the meals. The extent to which they were digested was, however, not very high. Sheep and cattle used the food to better advantage than pigs, the figures being 65 per cent. of *Laminaria* meal and 50 per cent. of *Fucus* meal digested by sheep and cattle, but only 34 and 32 per cent. of the respective meals being digested by pigs.

Seaweed meal, according to Dr. H. E. Woodman, School of Agriculture, Cambridge, has a starch equivalent of 38 and good meadow hay one of 37. It can therefore be assumed that for sheep and cattle the true feeding value of seaweed meal is about that of good meadow hay, but for pigs it is rather a low-grade food.

It is sometimes suggested that the mineral content of seaweed would be of great advantage to stock, but, since these minerals are present in the form of alkaline salts, the greatest care would have to be taken when feeding the meal, otherwise stock, especially pigs, would be subject to attacks of severe scouring.

If ever there were a demand for a seaweed meal, one of the greatest difficulties would be production at a price comparable with its true feeding value.

Bunches of fresh bananas from the Tiko banana plantations leaving the British Cameroons for Great Britain.

The Handling of Bananas

SPECIALLY CONTRIBUTED

Banana supplies are again reaching Britain, and there is every indication that increasing shipping space will be made available for West Indian production and that trade will, in due course, reach and exceed pre-war levels. As in many other spheres, the absence of this fruit during the war years has meant a complete stoppage of the research work which was developed pre-war; with the resumption of imports, this work is now receiving attention.

THERE are two problems involved in the handling of bananas to bring them to first-grade market quality. One is the avoidance of loss of fruit by natural causes such as frost, baking, or rotting. The other and more intricate one is the reduction, to the minimum, of the shrinkage which occurs in the ripening process.

The first problem has been largely mastered by research and experience. The second calls for a more scientific approach to the subject and is now being given the attention it deserves. Its importance lies in the fact that shrinkage during ripening may reach 5 per cent. of the bulk. This is obviously a major factor for those concerns interested only in bananas, and any successful reduction of this loss would be of material financial importance to such firms.

Storage Problems

Bananas are imported from the growing countries at a time and in a condition which ensures that they can be transported, distributed to the

Bananas are hung in the banana chamber, hands being alternatively arranged at high or low level. The cords are permanent roof fixtures, or may be tied to the hands when in transit to facilitate immediate suspension on arrival at the chamber.

depots, and released after storage for three to six days in the banana chambers. The timing of ripeness for such a distribution cycle is obviously important and has been carefully studied. Cargoes reaching this country are controlled and reach our ports at a stage in their development which should require only a limited degree of attention to ensure proper ripening and distribution.

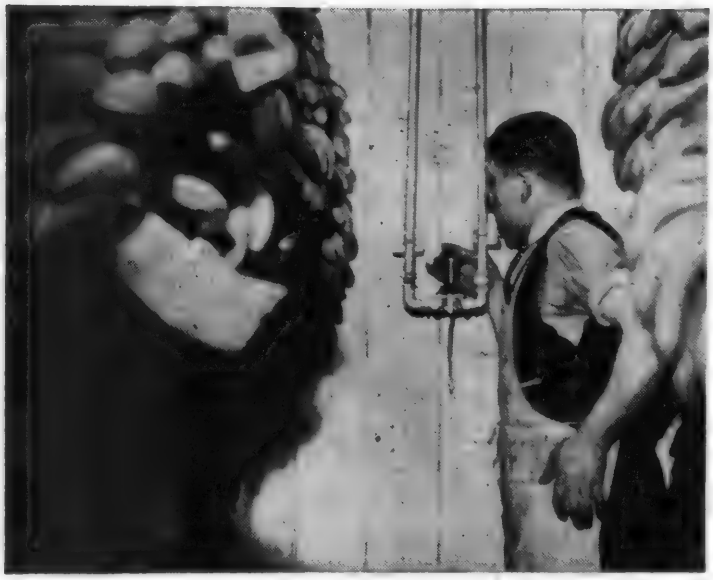
From that point onwards the utmost care is observed to ensure that no check occurs in the progressive ripening of the fruit; this is by no means easy, since the banana is the most delicate type of fruit in general consumption; but with adequate precautions there is a sound confidence that shipments can reach the market safely and with a minimum of loss.

At present there is little necessity to hold bananas in store. Immediately they ripen they are released and sold; to that extent the problem of competent handling has been simplified, as in most other food industries. Normally, however, there is a further factor which must be considered in the process—that of retaining the fruit over a period of glut, or poor prices, against a revival of interest and a higher market price.

Experimental work by the shippers has resulted in the development of special heating equipment, advice on ripening policy to minimise losses, the consideration of different types of materials and structures for chambers, and the manufacture of equipment to permit the safest handling of the cargoes. The benefits of this work are being daily accepted by many handlers of the fruit, and in a future period of greater importation must have increasing importance.

Jet burners located at floor level permit maintenance of temperature.

The average banana chamber now in use is not a scientifically developed structure. In many instances the fruit dealer is forced to rent a cellar in a fruit market, and he erects a banana chamber as a method of filling the space. One point which is immediately evident in these chambers is the lack of insulation. In the more modern chambers rubber or cork insulation is in general use. Wood is generally favoured as a constructional material, but here again there is scope for research into the most suitable material for both walls and flooring. The more modern chambers use concrete floors with special wall gutters to collect moisture, and are fitted with controlled systems of ventilation as



Gas pressure is controlled by a thermostat to ensure the perfect ripening of the bananas.

against the cruder types such as skylights and roof panels, used in the makeshift chamber.

Where it has been possible to build new holding chambers, modern insulation, controlled ventilation, proper heating equipment, and humidity controls have been incorporated, thereby rendering it possible to consider accurately the degree to which shrinkage can be reduced and loss from this source prevented to the maximum extent. This will undoubtedly be, a point to which attention will be given in due course. Continuous tests are made on this subject, balancing the received weight, including stalk, against the outgoing fruit, plus rejected spoiled fruit plus stalk. By means of checks of this nature the difference has been found to be in the region of 5 per cent., accountable only by shrinkage of the fruit in ripening.

The Ripening Process

On receipt of the fruit, immediate transportation in well-closed vans, lined generously with straw, is essential. If unloaded in a cold wind, protection must be given to avoid danger of chilling. West Indian bananas must be stood on their stalks, while Naked Canaries must be stood on their heads.

The chamber to which they are transferred must be insulated (this has been proved an ultimate economy despite initial cost), fitted with gas burners and thermometers, and capable of holding at least twice the weekly supply of fruit. If possible a firm should hold several chambers of varying size, where their trade is sufficiently great to ensure a large weekly turnover, the virtue of such a system being that varying quantities may be handled at varying stages of ripeness, since it is a cardinal point of handling that ripe and green bananas must not be included in the same chamber.

The average chamber now in use has at least two gas jets, with double burners, some 9 in. from the floor, and placed at opposite corners of the room. Suspended from hooks on the roof are stout cords, so arranged as to allow a central gangway up the room. A smaller chamber may have some 100 of these cords and two gas burners, a wholesale or import chamber up to 400 cords, holding 5 to 8 tons of fruit, and perhaps five burners arranged around the chamber.

It is generally agreed that the stringing of the bunches in trucks assists in expediting their removal and suspension in the chamber. This operation must be done quickly so as to minimise the check to ripening which will occur if any great delay is permitted. At this stage the bunches are checked and all bad or damaged fingers are removed; those which can be used are packed into boxes to ripen independently of the bunches. Similarly, all dropped bananas are removed and laid on a wooden tray in a room with green bananas. These precautions must obviously be limited by weather conditions, but are most important in winter, when it is imperative that the cargo be handled throughout immediately and packed into chambers already heated.

The skill of the operator is important. Very seldom will two consignments be comparable in condition, while weather is an important factor deciding the degree of heat required; and it is the operator who has to decide what procedure to follow.

As a general practice, summer consignments are put into the chamber at a temperature of 60° to 65° F., according to the grade, the lower temperature being preferred, since bananas ripened at a high temperature become overripe very quickly. In winter the recommended temperature is 75° F. for West Indians and 70° F. for Naked Canaries, it being important that the chamber should be preheated to sweat out any chill which may have been caught in transit.

These temperatures are maintained for 12 hours and in exceptional cases for 24 hours. They are then reduced to 60° to 65° F. and 60° to 62° F. respectively, as conditions and the nature of the fruit require. The fruit should break colour in

three days. If this does not happen, the bunches are cut up and the bananas ripened in boxes at a temperature of 65° to 70° F. Within that basic programme there is a very wide range of variations, dependent on whether it is desired to ripen the bananas quickly or to delay ripening until market conditions are favourable. Warm water sprinkled on the floor of the chamber will facilitate ripening, but any attempt to speed this up by the use of higher temperatures will cook the banana, resulting in a dry fruit of reduced weight content and greatly reduced eating quality. Any attempt, on the other hand, to delay ripening by retaining the banana at a low temperature is equally futile. A ripened banana cannot be kept at a very low temperature, the minimum temperature for ripe ones being 58° F.

Equal care must be taken to avoid chill by direct draught, and for this reason bottom ventilators or doors must be kept shut while the contents of the chamber are ripening. The approved method of cooling a chamber is by opening the top ventilator; even this must be used sparingly and with knowledge.

Heating Media

The heating medium in greatest use is town gas. Trials with alternative methods have shown that these are not equal in virtue or cost. Electricity gives a dry heat, which is detrimental to the ripening of the fruit. It is also relatively costly to instal and demands greater expense for each additional unit of installation or control. Steam heating has also been used, but is difficult to control. Moreover, the costs of installation and maintenance are excessive in relation to its performance. The increasing price of coal is another reason why this method has not been adopted.

Gas is, on the other hand, kind to the fruit, can be installed at negligible cost, is easily controlled, and is reasonably inexpensive. Its advantages are also increased by the fact that it produces a humidity not found in other forms of heating and which is beneficial to the fruit, while the gusher action of the burner creates a spiral pattern of heat and air circulation which could not be obtained under the steadier transmission of electrical or steam heat.

The normal equipment in use consists of a simple open Bunsen-type double-jet burner, and a patented thermostatic control, the Perfecta regulator, has been made available at very low cost to merchants. It is an elementary but most efficient unit, by means of which temperature can be controlled to the exact conditions desired.

Ripening Costs

It is difficult to give any precise figures to cover the costs of relative heating media and even to assess gas costs accurately. The heat needed varies very considerably according to the period of the year, and ripening costs will obviously vary between June and December. It may even be that summer consignments will ripen with a first shot of heat, while winter consignments will require continuing attention.

A check on 368 tons handled in one store early this year showed a cost of approximately £38, or about 2s. 4d. per ton, to ripen, when the gas rate was at its maximum level. This cost must be regarded as high and only a bare indication of the cost of ripening. A more average cost might be 1s. 7d. per ton.

Another factor involved is the length of time over which a consignment must be held, the proportion of defects, and the volume of shrinkage.

In conclusion, the main line of research is the investigation of the extent of shrinkage and methods to reduce this. Doubtless good results may be obtained by the development of properly insulated chambers and efficient air conditioning.

Peanut Butter

RECENT experiments in America at the Georgia Agricultural Experiment Station have been directed towards improving the quality and variety of flavour of peanut butter, 300,000,000 lb. of which were consumed in the U.S.A. in 1945 (*Food Packer*, 1945, **26**, p. 35).

Peanut butter is prepared from finely ground, freshly roasted, blanched groundnuts with salt added. The quality of the product depends on the variety of the nut used, time and temperature of roasting, and fineness of grinding. Free or esterified glycerol is often added to prevent separation of oil in storage.

In the experiments, of the forty substances added to the peanut butter, orange oil, chocolate, sweet pickles, cloves, olives, candied fruits, raisins, dates, malted milk, and jam gave attractive products which should have commercial possibilities.

To prevent separation of oil, the best method is to store at 50° F. or lower. Failing that, addition of 1-3 per cent. of hard fat or hydrogenated oil was satisfactory. A third means was the addition of some material to absorb separated oil, such as sucrose, dextrose, dried milk, raisins, oat flour, defatted soya flour, starch, or malted milk. The disadvantage of the last method is that the taste of the peanut butter is affected to some extent. Separation of oil was also retarded by packing under vacuum or by periodic inversion of the containers during storage.

The ease of spreading peanut butter was increased by finer grinding or by the addition of most of the substances used to absorb oil.

CORRESPONDENCE

Milk and Eggs for Children during Holidays

THE following is a transcript of correspondence passing between the Editor of FOOD MANUFACTURE and the Press Officer of the Ministry of Food:

The Press Officer,
Ministry of Food.

DEAR SIR,—I have had a large number of enquiries with reference to the rations of milk and eggs for boarding-school children at home for the holidays. At boarding school they receive one pint of milk per day, whereas as soon as they get home the allowance is reduced to half a pint.

It would also be interesting to know why parents are not able to get eggs for their children while they are at home, although the school authorities can obtain them when they are at school.

Yours faithfully,
The Editor.

The Editor,
Food Manufacture.

DEAR SIR,—You wrote to me on August 7 about milk and eggs for boarding-school children during holidays.

When boarding-school children go home for holidays they are given temporary ration cards for the holiday period and also their blue R.B.4 ration books. These books identify them as "priority" consumers of milk and enable them to get the priority allowance of 3½ pints of milk a week which is made available to all children between the ages of 5 and 18. It is not possible to arrange for either boarding-school or day-school children to get at home during the holidays the extra milk they get at school during term under the Milk in Schools Scheme.

With regard to eggs, the position is that retailers receive their supplies mainly on the basis of the number of their registered customers. It is only on this basis that we can distribute supplies to them according to their known requirements. At each allocation of eggs, however, retailers also get a marginal allowance on their permit quantities for the purpose of supplying unregistered customers who hold temporary ration cards. Retailers cannot tell, however, how many such customers they will be asked to serve at any time, and their marginal allowance may not be sufficient to supply every holder of a temporary ration card who asks to be served with eggs.

In order to ensure that every boarding-school child obtained eggs during holiday periods it would be necessary to allow the child to register with a retailer, but the administrative work involved in this procedure would be enormous in order to provide them with one or two eggs during the holiday periods. In many cases the child does not spend the whole of his vacation in one place, but often spends part of it away from home. In these cases registration would be useless. At the end of the holidays the children's registrations would have to be cancelled and the retailers' permits adjusted. This temporary registration procedure would have to be carried out three or four times a year when the children came home and cancelled when they returned to school. We could not undertake it for the large number of children involved, and even if we endeavoured to put such a procedure into operation, there could be no guarantee that an allocation of eggs would be made to retailers in a particular area during the holiday period, particularly during the Christmas holidays, when eggs are in short supply and allocations at that time may take several weeks to complete.

Yours faithfully,
The Press Officer,
MINISTRY OF FOOD.

Fuel Economy

TO THE EDITOR OF FOOD MANUFACTURE

DEAR SIR,—I should like to offer one or two criticisms of the article "Fuel Economy in the Factory" published in the September issue of FOOD MANUFACTURE.

I cannot agree that "it will be found more economical to operate boilers at the possible minimum load than to bank them." My experience has been that working a boiler (or boilers) at minimum load unless absolutely imperative causes losses through admission of excess air through thin fires or partially uncovered grates.

I also disagree with the statement that "insulation of a boiler, pipework, and other surfaces, the proper insulation of brickwork settings, flues, etc.," will reduce the possibility of boiler settlement, or that "resultant damage to pipework connections, fittings, etc., will be considerably minimised." Insulation will, of course, reduce fuel consumption, but the possibility of boiler settlement and resultant damage to pipework connections, fittings, etc., will in no way be minimised by such treatment. This can only be accomplished by frequent and careful inspection, which is certainly not "insulating," particularly in the case where shell-type boilers, such as the Lancashire, Yorkshire, and Cornish boilers, are in use. What is called for in these cases is careful inspection of seating blocks to ensure that disintegration is not occurring, leaving the boiler "hanging" on to the steam main to which it supplies steam.

Yours faithfully,
H. C. APPLEBY, M.Inst.F., A.M.I.Mech.E.

Bristol.

The Essential Amino Acids

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By common consent the term essential amino acid is restricted to those amino acids which the animal cannot synthesise from ammonia, or some similar source, and non-nitrogenous substances derived from fat, carbohydrate, or other amino acids. They are, therefore, indispensable dietary constituents and are normally ingested in the form of proteins.

WILLCOCK and Hopkins (1906) first clearly demonstrated that an amino acid can be an indispensable component of food. They showed that a diet containing the protein zein alone could not maintain growth in young rats but that the addition of tryptophan, though unable to allow growth, diminished the loss of weight and prolonged life. Later, Osborne and Mendel (1914) showed that the addition of tryptophan+lysine was followed by growth, though neither alone was effective.

The experiments of Willcock and Hopkins depended on the "deficiency method," *i.e.* if a diet which lacks some known factor produces a defect and the addition of the missing factor abolishes the defect, it may be concluded that the factor concerned was an indispensable constituent of a satisfactory diet. By this method, histidine was added to the list of amino acids essential to the growing rat (Ackroyd and Hopkins, 1916). The method, however, has strict limitations, owing to the difficulty of ensuring a complete absence of a given amino acid from the diet. Further, one amino acid which is not, strictly speaking, essential may spare another which is and so appear indispensable. Thus, the evaluation of experimental data is often rendered uncertain.

Systematic researches by Rose and his associates were based on the use of known mixtures of pure amino acids. These first showed that growth-producing proteins contained at least one essential amino acid not included among the twenty-one then generally accepted (Rose, 1931-1932). The work of Womack and Rose (1935-1936) led to the isolation and identification of α-amino-β-hydroxybutyric acid, the actual isomer found being named threonine (Meyer and Rose, 1936), as well as the final proof that it is an essential amino acid for the growing rat and probably the only one then remaining to be discovered.

Before then, Womack and Rose (1934) had proved that phenylalanine is an essential dietary constituent and later that tyrosine is not (Rose, 1938). This disposed of the idea that these two acids are mutually interchangeable, but forces the conclusion that phenylalanine is oxidisable to tyrosine *in vivo*.

In their search for threonine, Womack and Rose had demonstrated that isoleucine is indispensable for growth in the rat, and it was quickly shown that leucine is also an essential, as curiously enough is valine (Rose and Eppstein, 1939). The position of arginine was then clarified. Ackroyd and Hopkins (1916) had supposed arginine and histidine to be interchangeable and were supported by Geiling (1920), but neither Stewart (1925) nor Rose and Cox (1924, 1926) were able to confirm this. In 1930, Scull and Rose demonstrated that arginine can be synthesised by the rat. Black and Rose (1938) found that on an arginine-free diet growth was less than when arginine was present. It is, therefore, concluded that arginine is indispensable, but that synthesis may be sufficient for maintenance, or even subnormal growth, and the amino acid may not be essential to the adult rat.

On the basis of deficiency experiments, Osborne and Mendel (1915) regarded cystine as an essential amino acid, and numerous workers confirmed this. In 1932, however, Jackson and Block, and also Weichselbaum, Weichselbaum and Stewart, noted that methionine could equally well supplement a low casein diet. Womack, Kemmerer, and Rose (1937) then showed that methionine could replace cystine completely, although cystine without methionine was ineffective in inducing growth. Hence, methionine is an essential amino acid and cystine is not.

It appears, then, that for the growing rat, the essential amino acids are: lysine, tryptophan, histidine, threonine, phenylalanine, isoleucine, leucine, valine, arginine, and methionine and a diet containing only these ten amino acids will support normal growth.

Amino Acids Essential to Other Species

Amino acid requirements of the adult animal for maintenance may differ from those of the young animal for growth. Stewart (1925) found that adult rats on a diet deficient in histidine main-

Abstract of a paper read at the Fourteenth Scientific Meeting of the Scottish Group of the Nutrition Society.

tained weight and allantoin excretion, whereas young rats on the same diet lost weight and excreted greatly reduced amounts of allantoin. By feeding pure amino acid mixtures, Nielsen and Carley (1939) and Wolf and Corley (1939) showed that of the ten amino acids essential to the growing rat only arginine could be omitted for the adult rat if N balance was to be maintained. Bauer and Berg found the same to be true of the mouse as did Rose and Rice (1939) in so different a species as the dog. Ruminants present a special problem, for protein synthesis by micro-organisms in the paunch has been proved to occur (Harris and Mitchell, 1941).

In man, only short experiments have been made. Rose, Haines, Johnson and Warner (1943) showed that a diet of which 95 per cent. of the nitrogen was supplied by the 10 amino acids essential to the rat maintained N balance in man. Withdrawal of valine, isoleucine, or phenylalanine produced a negative N balance as did, though to a lesser extent, the withdrawal of leucine, threonine, or methionine. Surprisingly, withdrawal of histidine was without effect. But Albanese *et al.* (1944) showed that adult men on a diet deficient in histidine lost weight though they maintained N balance.

These experiments (excluding those on man) suggest that qualitative differences in amino acid requirements in different mammalian species are relatively small though quantitative variations may be more marked. The chick, however, has been shown to need glycine as well as glutamic acid for growth.

Under abnormal conditions, amino acids not ordinarily needed may become indispensable. Though the evidence is not very strong, it suggests that the supplies of certain amino acids from synthesis *in vivo* may be insufficient when exceptional demands have to be met and in these circumstances dietary supplements may be required. Detoxication processes may at times cause exceptional demands and excessive intake of benzoate, for example, may necessitate dietary supplements of glycine.

Quantitative Differences

Quantitative differences between species certainly seem to exist. Much as we desire quantitative evaluation of the essential amino acid requirements, the problem is difficult. The need for a particular amino acid is not necessarily a fixed and absolute amount but may be conditioned by the supply of other amino acids. Block (1943), however, has made tentative calculations of the essential amino acid requirements of man using *inter alia*, data of the *per capita* food consumption in the U.S.A. in the years 1937-1941 and the incomplete data on the amino acid composition of individual proteins. He arrived at the following estimates:

Cystine+methionine	3·5— 4
Arginine	4— 5
Lysine	5— 6
Tryptophan	1— 1·24
Phenylalanine	4— 4·5
Threonine	3·5
Leucine	10·0
Valine	4— 4·5
Isoleucine	3— 3·5

Possible Substitutes for Natural Essential Amino Acids

It is obvious that the essential amino acids cannot be completely synthesised in the animal body in sufficient amounts from non-protein sources. The fundamental need seems to be for some special arrangement of atoms which can be supplied either by the amino acid or by one of a number of closely related compounds. It is of interest to note that in some cases the natural amino acids can be replaced more or less successfully by the optical antipode, the corresponding keto- or hydroxy-acid, the N-acetyl or the N-formyl derivative. The study of these relationships may throw further light on the reactions involved in the metabolism of the amino acids concerned.

Special Functions

Amino acids are undoubtedly used for construction purposes other than the manufacture of proteins, *e.g.* their use in detoxication processes. Some such purposes are known and others are guessed at.

The first suggestion of a special function seems to have been made by Ackroyd and Hopkins (1916), viz., that histidine (and, they thought, arginine) might be utilised as a precursor of the purines needed in the elaboration of nucleoproteins since the iminazole nucleus is present in both purines and histidine. Experiments showed that young rats on a histidine deficient diet failed to grow or even maintain their bodyweight and excreted very much less allantoin than when fed complete casein hydrolysate (supplemented with tryptophan). A second special function of histidine would seem to be the formation of histamine. The origin of histamine is not definitely known, but the experiments of Werle (1936, 1940) suggest the deamination of histidine in the kidney, and Holtz *et al.* (1940) have observed that this reaction may be brought about by other organs.

In the case of phenylalanine, there is little doubt that it is the precursor of both adrenalin and thyroxin. The oxidation of phenylalanine to tyrosine, already mentioned, and its further oxidation to 3·4-dihydroxyphenylalanine, brought about in plants by tyrosinase, may also occur in animals (Bloch, 1927). The formation of adrenalin from these substances has not been completely demonstrated but it has been shown that various tissues, particularly liver and kidney, contain decarboxylases capable of converting tyrosine and dihydroxyphenylalanine to the corresponding amines (Holtz

et al., 1939; Blaschko, 1942) and that tyramine is convertible to adrenalin in the medulla of the adrenal glands (Schuler and Weidemann, 1935).

Thyroxin, it was suggested by Harington and Barger (1927), may be formed from 2 molecules of 3·5-diiodotyrosine by the elimination (in effect) of a molecule of alanine, and diiodotyrosine may be produced by the direct iodination of tyrosine. Von Mutzenbecher (1939) obtained traces of thyroxin by incubating alkaline solutions of diiodotyrosine in presence of air. The conversion of diiodotyrosine to thyroxin thus appears to involve oxidation, a suggestion developed by Johnson and Tewkesbury (1942) and clearly proved by Harington and Pitt-Rivers (1945). A third possible, or probable, special use of phenylalanine is in the formation of melanins. It is clear from the work of Bloch (1927) that the melanophores of skin can produce melanins from dihydroxyphenylalanine.

The elucidation of the special function of methionine starts with the demonstration by Tucker and Eckstein (1937) that methionine is a lipotropic agent, preventing the fatty infiltration of the liver induced in rats by a diet deficient in choline. This was followed by the observation (Du Vigneaud *et al.*, 1939) that although homocystine could not replace methionine in growth experiments on young rats, it could do so in presence of choline. Thus, methionine renders dietary choline unnecessary and choline renders preformed methionine unnecessary provided homocystine is available. The deduction is that choline can be formed by the transference to some precursor of the methyl group of methionine and that conversely choline can yield a methyl group to homocystine and so form methionine (Simmonds and Du Vigneaud, 1942). Extension of this work shows methionine to be a more general "methylating agent," and to give up its methyl group in, for example, the synthesis of creatine.

Formation of Cysteine

A second important function of methionine is the formation of cysteine (and thence cystine) which is dispensable if the supply of methionine is adequate, but becomes a dietary requisite if there is a deficiency of methionine, or if the demands for cysteine are abnormally great. Methionine can yield cysteine though the reverse change does not occur. The most probable route seems to be by demethylation of methionine followed by donation of the sulphydryl group of homocysteine to a suitable acceptor, probably serine. Homocysteine reacts with serine to give cystathionine, and probably this is then hydrolysed with formation of cysteine (Du Vigneaud, 1942).

The utilisation of arginine in the formation of urea by its participation in the ornithine cycle (Krebs and Henseleit, 1932) is fairly generally accepted as representing an important mode of formation of urea. It must, therefore, be considered as a special function, though it does not seem likely to be the key function, of arginine.

No evidence of special function has been adduced for the other essential amino acids, but this does not mean they have none. It may well be, however, that these substances, required for protein synthesis if for nothing else, merely possess structural peculiarities which render their synthesis in the animal body difficult or impossible.

In general, lack of an essential amino acid produces no specific symptoms such as are associated with vitamin deficiencies. But it may be significant of a special function, yet undiscovered, that deprivation of valine causes, in addition to loss of weight, profound nutritive failure and lack of appetite, a curious sensitivity to touch, and a lack of co-ordination in movement (Eppstein and Rose, quoted by Rose, 1938). Lysine deficiency has been described as producing (in man) nausea, dizziness, and a hypersensitivity to metallic sounds (Albanese *et al.*, 1943). Arginine deficiency, also in man, has been said to result in decreased production of spermatozoa (Holt *et al.*, 1942), while cystine deficiency in rats was claimed by Weichselbaum (1935) to produce a specific syndrome in which liver damage was prominent. Special functions are not, however, possessed only by essential amino acids. One may instance, in support of this, the use in the detoxication processes of glycerine and glutamic acids and the special role of glutamic and aspartic acids in the transfer of amino groups (transamination).

REFERENCES

Abderhalden, E. (1915), *Ztschr. physiol. Chem.*, **96**, 1.
Ackroyd, H., and Hopkins, F. G. (1916), *Biochem. J.*, **10**, 551.
Albanese, A. A., Holt, L. E. (Jr.), Brumback, J. E. (Jr.), Hayes, M., Kajdi, C. N., and Wangerin, D. M. (1941), *Proc. Soc. Exp. Biol. Med.*, **48**, 728.
Albanese, A. A., Holt, L. E. (Jr.), Brumback, J. E. (Jr.), Kajdi, C. N., Frankston, J. E., and Wangerin, D. M. (1943), *Proc. Soc. Exp. Biol. Med.*, **52**, 209.
Albanese, A. A., Holt, L. E. (Jr.), Frankston, J. E., and Irby, V. (1944), *Johns Hopkins Hosp. Bull.*, **74**, 251.
Almquist, H. J., and Grau, C. R. (1944), *J. Nutrition*, **28**, 325.
Almquist, H. J., and Mecchi, E. (1940), *J. Biol. Chem.*, **135**, 355.
Almquist, H. J., and Mecchi, E. (1941), *Proc. Soc. Exp. Biol. Med.*, **48**, 526.
Almquist, H. J., Stokstad, E. L. R., Mecchi, E., and Manning, P. D. V. (1940), *J. Biol. Chem.*, **134**, 213.
Arnold, A., Kline, O. L., Elvehjem, C. A., and Hart, E. B. (1936), *J. Biol. Chem.*, **116**, 699.
Bach, S. J. (1939), *Biochem. J.*, **33**, 1833.
Barnes, F. W. (Jr.), and Schoenheimer, R. (1943), *J. Biol. Chem.*, **151**, 123.
Bauer, C. D., and Berg, C. P. (1943), *J. Nutrition*, **28**, 51.
Benedict, S. R. (1915-1916), Harvey Lectures, **11**, 346.
Black, H. C., and Rose, W. C. (1938), Quoted by Rose (1938).
Blaschko, H. (1942), *J. Physiol.*, **101**, 337.
Bloch (1927), *Handbuch f. Haut- und Geschlectskrankheiten*, Springer, Berlin.
Bloch, K., and Schoenheimer, R. (1941), *J. Biol. Chem.*, **138**, 155.

Block, R. J. (1943), *Yale J. Biol. Med.*, **15**, 723.
Borsook, H., and Dubnoff, J. W. (1941), *J. Biol. Chem.*, **141**, 717.
Brand, E., Cahill, G. F., and Harris, M. M. (1935), *J. Biol. Chem.*, **109**, 69.
Burroughs, E. W., Burroughs, H. S., and Mitchell, H. H. (1940), *J. Nutrition*, **19**, 363, 385.
Daggs, R. G. (1940), *Amer. J. Obstet. Gynecol.*, **40**, 457.
Dakin, H. D. (1920), *J. Biol. Chem.*, **44**, 499.
Embden, G., and Baldes, K. (1913), *Biochem. Ztschr.*, **55**, 301.
Felix, K., and Naka, S. (1940), *Ztschr. physiol. Chem.*, **264**, 123.
Foster, G. L., Rittenberg, D., and Schoenheimer, R. (1938), *J. Biol. Chem.*, **125**, 13.
Gornall, A. G., and Hunter, A. (1943), *J. Biol. Chem.*, **147**, 593.
Goss, H. (1943), *Nutr. Abs. Rev.*, **12**, 531.
Griffith, W. H. (1929), *J. Biol. Chem.*, **82**, 415.
Harington, C. R., and Barger, G. (1927), *Biochem. J.*, **21**, 169.
Harington, C. R., and Pitt-Rivers, R. V. (1945), *Biochem. J.*, **39**, 157.
Harris, L. E., and Mitchell, H. H. (1941), *J. Nutrition*, **22**, 167, 183.
Holt, L. E. (Jr.), Albanese, A. A., Shettles, L. B., Kajdi, C., and Wangerin, D. M. (1942), *Federation Proc.*, **1**, 116.
Holtz, P., Credner, K., and Walker, H. (1939), *Ztschr. physiol. Chem.*, **262**, 111.
Huff, J. W., and Perlzweig, W. A. (1943), *J. Biol. Chem.*, **150**, 395.
Hunter, A., and Dauphinee, J. A. (1925), *Proc. Roy. Soc. [B]*, **97**, 227.
Jackson, R. W., and Block, R. J. (1932), *J. Biol. Chem.*, **98**, 465.
Johnson, T. B., and Tewkesbury, L. B. (1942), *Proc. Nat. Acad. Sci. Washington*, **28**, 73.
Klose, A. A., and Almquist, H. J. (1941), *J. Biol. Chem.*, **138**, 467.
Klose, A. A., Stokstad, E. L. R., and Almquist, H. J. (1938), *J. Biol. Chem.*, **123**, 691.
Krebs, H. A. (1942), *Biochem. J.*, **36**, 758.
Krebs, H. A., and Henseleit, K. (1932), *Ztschr. physiol. Chem.*, **210**, 33.
Lewis, H. B. (1935), *J. Nutrition*, **10**, 99.
Ludwig, W., and Mutzenbecher, P. v. (1939), *Ztschr. physiol. Chem.*, **258**, 195.
McCoy, R. H., Meyer, C. E., and Rose, W. C. (1935-1936), *J. Biol. Chem.*, **112**, 283.
Madden, S. C., Nachren, W. A., Warauch, G. S., and Whipple, G. H. (1939), *J. Exp. Med.*, **69**, 721.
Mutzenbecher, P. v. (1939), *Ztschr. physiol. Chem.*, **261**, 253.
Meyer, C. E., and Rose, W. C. (1936), *J. Biol. Chem.*, **115**, 721.
Nielsen, E. K., and Corley, R. C. (1939), *Amer. J. Physiol.*, **126**, 223.
Osborne, T. B., and Mendel, L. B. (1914), *J. Biol. Chem.*, **17**, 325.
Osborne, T. B., and Mendel, L. B. (1915), *J. Biol. Chem.*, **20**, 351.
Popiel, L. V. (1940), *J. Physiol. U.S.S.R.*, **29**, 362.
Robscheit-Robbins, F. S., Miller, L. L., and Whipple, G. H. (1943), *J. Exp. Med.*, **77**, 375.
Rose, W. C. (1931-1932), *J. Biol. Chem.*, **94**, 155.
Rose, W. C. (1938), *Physiol. Rev.*, **18**, 109.
Rose, W. C. (1944), Quoted in *Annu. Rev. Biochem.*, **13**, 240.
Rose, W. C., and Cook, K. G. (1925), *J. Biol. Chem.*, **64**, 325.
Rose, W. C., and Cox, G. J. (1924), *J. Biol. Chem.*, **61**, 747.
Rose, W. C., and Cox, G. J. (1926), *J. Biol. Chem.*, **68**, 217.
Rose, W. C., and Eppstein, S. H. (1939), *J. Biol. Chem.*, **127**, 677.
Rose, W. C., Haines, W. J., and Johnson, J. E. (1942), *J. Biol. Chem.*, **146**, 683.
Rose, W. C., Haines, W. J., Johnson, J. E., and Warner, D. T. (1943), *J. Biol. Chem.*, **148**, 457.
Rose, W. C., and Rice, E. E. (1939), *Science*, **90**, 186.
Schenck, J. R., Simmonds, S., Cohn, M., Stevens, C. M., and Du Vigneaud, V. (1943), *J. Biol. Chem.*, **149**, 355.
Schoenheimer, R., Ratner, S., and Rittenberg, D. (1939), *J. Biol. Chem.*, **127**, 333.
Schoenheimer, R., Ratner, S., and Rittenberg, D. (1939a), *J. Biol. Chem.*, **130**, 703.
Schuler, W., and Weidemann, A. (1935), *Ztschr. physiol. Chem.*, **233**, 235.
Scull, C. W., and Rose, W. C. (1930), *J. Biol. Chem.*, **89**, 109.
Shambaugh, N. F., Lewis, H. B., and Tourtelotte, D. (1931), *J. Biol. Chem.*, **92**, 499.
Simmonds, S., and Du Vigneaud, V. (1942), *J. Biol. Chem.*, **146**, 685.
Stetten, D. (1941), *J. Biol. Chem.*, **138**, 437; **140**, 143.
Stetten, D. (1942), *J. Biol. Chem.*, **144**, 501.
Stewart, C. P. (1925), *Biochem. J.*, **19**, 1101.
Sure, B. (1941), *J. Nutrition*, **22**, 491.
Trowell, O. A. (1941), *J. Physiol.*, **100**, 432.
Tucker, H. T., and Eckstein, H. C. (1937), *J. Biol. Chem.*, **121**, 479.
Du Vigneaud, V. (1941), *Biol. Symp.*, **5**, 234.
Du Vigneaud, V., Brown, G. B., and Chandler, J. P. (1942), *J. Biol. Chem.*, **143**, 59.
Du Vigneaud, V., Chandler, J. P., Cohn, M., and Brown, G. B. (1940), *J. Biol. Chem.*, **134**, 787.
Du Vigneaud, V., Chandler, J. P., and Moyer, A. W. (1941), *J. Biol. Chem.*, **139**, 917.
Du Vigneaud, V., Chandler, J. P., Moyer, A. W., and Keppel, D. M. (1939), *J. Biol. Chem.*, **128**, cviii; **131**, 57.
Du Vigneaud, V., Cohn, M., Chandler, J. P., Schenck, J. R., and Simmonds, S. (1941), *J. Biol. Chem.*, **140**, 625.
Werle, E. (1936), *Biochem. Ztschr.*, **286**, 293.
Werle, E. (1940), *Biochem. Ztschr.*, **304**, 201.
Weichselbaum, T. E. (1935), *Quart. J. Exp. Physiol.*, **25**, 363.
Weichselbaum, T. E., Weichselbaum, M. B., and Stewart, C. P. (1932), *Nature*, **129**, 795.
Weiske, H., Schrodt, M., and Dangel, S. V. (1879), *Ztschr. Biol.*, **15**, 261.
Willcock, E. G., and Hopkins, F. G. (1906), *J. Physiol.*, **35**, 88.
Wolf, P. A., and Corley, R. C. (1939), *Amer. J. Physiol.*, **127**, 589.
Womack, M., Kemmerer, K. S., and Rose, W. C. (1937), *J. Biol. Chem.*, **121**, 403.
Womack, M., and Rose, W. C. (1934), *J. Biol. Chem.*, **107**, 449.
Womack, M., and Rose, W. C. (1935-1936), *J. Biol. Chem.*, **112**, 275.
Womack, M., and Rose, W. C. (1936), *J. Biol. Chem.*, **116**, 381.
Womack, M., and Rose, W. C. (1941), *J. Biol. Chem.*, **141**, 375.

BOOKS RECEIVED

Successful Canteen Management. By J. Douglas Mitchell.

World Grain Review and Outlook, 1945. By Helen C. Farnsworth and V. P. Timoshenko.

Milk Production and Control. By W. Clunie Harvey and H. Hill.

Natives walking through a flying storm of locusts near the borders of Kenya and Uganda, where infestation is severe.

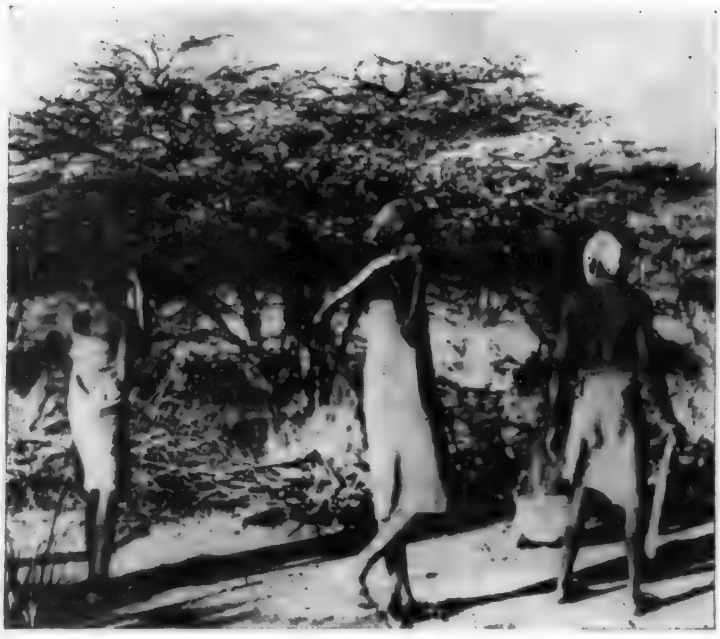
The Locust Menace

FOOD shortages bring into prominence the perennial problem of the locust, known since biblical days and now much in evidence around Viterbo and the Pontine Marshes, where UNRRA has planned a full-scale offensive. This war against the oldest of plagues has raged over Asia, over the Americas, and from the Arabian Gulf and the Mediterranean to South Africa. It has created international locust conferences, centres of anti-locust research, and bureaux of intelligence on locusts. There are "report centres" where maps indicating the threatened areas are marked, and degree of attack is communicated as rapidly as possible. Sixteen nations have collaborated far better than on the question of peace.

The use of phosgene today in Italy recalls all the anti-locust resources science has called upon, from arsenical sprays to flame-throwers, resources far more destructive than any in classical days when the peoples of Cyrenaica were compelled by law to make war three times a year on the locust. "He who fails to do this incurs the penalty of being a deserter" was the order of the day. Martial law in Syria ordered all inhabitants to the front. When the voice of the locust was heard in the land, the people of Lemnos were given a measure which each had to fill with locusts he had killed, and bring it to the magistrate. The war years—and these post-war years with locust swarms consuming crops—have not permitted any slackening of effort. Britain and France early realised the need for collaboration; their empires are contiguous, and one great breeding-ground of the migratory species is a bend in the Niger River in French territory, whence plagues swarm over British possessions. A second is the Lake Rukwa region of Tanganyika, where the red locust multiplies; a third is along the shores of the Red Sea. Once the great clouds leave such breeding-grounds and descend on cultivated regions, all resources are of little avail in preventing the locust living on the land to the extent of millions of pounds a year.

The trouble with the locust is the lack of controlling agents, those predators and parasites which Nature provides at times. Pine sawflies in Britain have been countered by parasites fatal to them; New Zealand earwigs were laid low by a quarter of a million ichneumon flies sent by air; while Queensland woolly aphides went down to an army of small wasps. To exterminate sugar-cane pests in Queensland large toads were despatched from the Farnham Imperial Institute laboratories—with success after some little trouble; for the toads,

Bait is loaded on a truck which moves slowly over the ground infested by hoppers, which devour the bait as it is thrown out by workmen.



Destroying locusts by the old method of burning.

developing urban if not urbane habits, hopped into town by night, were bitten by a prize greyhound failing to recognise them as Empire-builders, and the greyhound died. This method of ensuring a balance in Nature fails with the locust. Only in Bulgaria, where a blacklist of bird pests was made, was there small success when reprieve for the raven came after large numbers reduced locust swarms attacking cereals and tobacco. Unlike such occasional plagues as cockchafers, which carpeted Danish roads so as to make driving dangerous, locust invasions are annual and widespread. There are many official papers telling of "vast concentrations" of locusts assembling in Eritrea and in plains bordering the Red Sea, especially where fresh vegetation is found in river valleys. Incipient swarms may be thinned out by poison; the remainder then revert to the "solitary phase." But such solitary invaders set up new quarters and swarm again from Abyssinia and elsewhere into the Sudan. Yellow locusts, "summer-bred" locusts which stage a return migration in Africa and converge on coastal plains—these and others multiply in defiance of all attacks.

Finding More Efficient Poisons

Yet, despite disappointments in the past, research goes on to find more efficient agents than arsenical sprays, phosgene, and other poisons difficult to apply. In an age of D.D.T. this international problem, now so urgent with the world's harvests already allocated, should be capable of being solved. Not so long ago promising results were reported from Berkshire laboratories, in which, after recognising that the pest must be destroyed in its breeding-grounds, the reactions of locusts when first hatched out as wingless hoppers towards benzene hexachloride or "gammexane" were studied. This simple derivative of benzene and chlorine is far more effective and easier to apply than arsenical sprays. It was first prepared, it may be recalled, by Michael Faraday, that inspired man of science who was fascinated for a time by chlorine, liquefying the gas to an oil, and replying so succinctly to the impetuous Dr. Paris, who had chided him for using "greasy" vessels: "Dear Sir, the oil you noticed yesterday was liquid chlorine. Yours faithfully, Michael Faraday." What a strange whim of fortune if this chlorine derivative, prepared by a pioneer who just a century ago returned after serious brain trouble to benefit science yet further, should prove the answer to the eternal problem of the locust which has threatened our food supplies so long!

Electricity Fights Vegetable Parasites

UNEQUAL distribution of anti-parasitic products, failure to adhere to vegetable surfaces, and inability to penetrate leaves were three of the reasons for the failure of products formerly used for spraying in liquid or fine powder form to fight vegetable parasites. Describing the use of electricity to combat these, M. Oleg Yadoff, in a paper read before the Academy of Sciences, stated that all these disadvantages can be considerably reduced by this means.

In effect, a tree, plant, or herb can be used as an earth conductor. An electrified particle, positively or negatively charged, is drawn by the conductor to the electrical field between the particle and the nearest part of a vegetable organism. The electrification ensures that anti-parasite powder is regularly distributed and remains fixed to the leaves.

Since high-tension electrification is cumbrous, fragile, and dangerous, experiments have been made for electrifying the powder by simple projection across a generating pipe, the spontaneous electrification enabling all high-tension installation to be eliminated.

Non-Enzymatic Browning in Foods

Abstracts of papers read at the September meeting of the Division of Agriculture and Food Chemistry of the American Chemical Society.

THE symposium was inaugurated by M. L. Anson, who briefly outlined the subject of non-enzymatic browning as a food problem, with special emphasis on the severe Army problems which have stimulated the recent great interest in browning. Deterioration due to non-enzymatic browning was particularly serious in the dehydrated foods which the Army had to use, and became more important when the war moved to the Pacific area, where foods were stored for long times at high temperatures. The Committee on Food Research of the Quartermaster Corps accordingly sponsored a programme of research projects throughout the country which have been concerned with browning in major Army ration items and with studying the fundamental nature of the browning reaction. The experience of the Army with food deterioration due to browning and the general character of the Army research programme were discussed.

Sugar Reactions giving Rise to Coloured Products

A paper presenting a brief review of certain reactions of the sugars which produce coloured end-products, and particularly those reactions which may be of importance in the preparation and preservation of foods and related products, was read by Sidney M. Cantor and Charles D. Hurd. For purposes of discussion three classifications of reactions were considered:

Reactions of sugars alone in acidic systems.
Reactions of sugars alone in basic systems.
Reactions between sugars and nitrogen-containing substances, particularly amino acids.

The action of acids on sugars in aqueous solutions is known to produce a variety of dehydration products. Furfural is obtained from the pentoses in this fashion, and from the hexoses both 5-hydroxymethylfurfural and levulinic acid are formed. Since these materials tend to darken on storage, and since their formation is possible during the preparation of many food products, their role in food discoloration may be of major importance.

Similarly, the more complex reactions of sugars in alkaline systems may also produce fragments which in turn contribute to the development of discoloration. Some of the products which are formed in such reactions were considered.

Finally, the so-called Maillard or "melanoidin" reaction, which is thought to be the primary contributor to discoloration in food products, was reviewed, and the knowledge of it in relation to the more simple sugar-amine and sugar-amino acid systems discussed.

Industrial Aspects of Browning

Industrial food laboratories have become increasingly conscious of a deteriorative type of chemical reaction resulting in off-coloured and off-flavoured food products. H. M. Barnes and C. W. Kaufman pointed out that, commonly known as "browning," the reaction is actually a chemical combination of proteins with carbohydrates, resulting in the formation of dark-coloured pigments in the food product. Anti-oxidants are not effective, and, of all control techniques studied to date, sulphur dioxide is the most effective. Concentrations needed for control vary with the product under study—nitrogen content, sugar content, oxygen content, *p*H, storage temperature, and moisture all being factors in the rate of reaction.

Basic research on browning, covering hundreds of test-tube reactions between amino acids and aldehydes, indicates that the reaction proceeds stepwise and parallels the reactivity of the specific acid and sugars being reacted. These basic studies have indicated that the "off-flavour" character developed is not always the same and that a characteristic flavour is specifically dependent upon the particular amino acid that participates in the reaction. An essentially true maple flavour has been synthesised in this way by fusion of alpha-amino butyric acid with glucose. Optimum conditions for this fusion or roasting have been established, and the chemistry of the reaction has been catalogued.

Industrially, it is believed that the desirable flavour of toasted cereal, roasted coffee, caramelising milk, etc., may be attributable to such reactions. Positive contributions of the reaction to food flavours may be industrially as important as control of its depreciating aspects.

Dehydrated Vegetables during Storage

Discussing the factors that govern the rate of browning in dehydrated vegetables, R. R. Legault, William F. Talburt, Anne M. Mylne, and Louise A. Bryan stated that these were temperature, moisture and sulphite contents, kind of vegetable, fraction of natural constituents retained, and atmosphere of pack. Of these, storage temperature and

moisture content are the most important. For one lot of dehydrated white potatoes, varying in moisture content from 4 to 8 per cent., the time required for a given colour development varied exponentially with absolute temperature at constant moisture content and with moisture content at constant temperature. Thus "storage life" doubled with a 6·2° F. drop in temperature or with a 2 per cent. (absolute) drop in moisture content. The influence of oxygen on rate of browning is also positive though relatively small. Sulphite tends to protect against browning during both dehydration and storage. The magnitude of the sulphite effect is a function of sulphite concentration, and this effect persists in accord with the factors, principally moisture content and temperature, that govern the rate of disappearance of sulphite. Loss of natural constituents through leaching leads to a lowered browning rate in the dehydrated product.

Dried Fruit

Among other papers of interest forming part of the symposium was one by E. R. Stadtman, who discussed the general problem of browning in dried fruits. Emphasis was placed on experimental procedure and on the more recent observations concerning the nature of the reactions involved.

The addition of sulphur dioxide to dried fruit greatly retards browning; during storage the SO_2 is irreversibly converted into an organic compound. This compound has been isolated in relatively pure form and some of its properties have been studied. It is a carbohydrate derivative with relatively strong acidic properties ($pKa = 2·2$). The salts are generally stable solids, but concentrated solutions of the acid darken very rapidly at room temperature.

The importance of sugar in the browning reaction is demonstrated by the fact that apricot concentrates from which the sugar is removed by fermentation do not darken as rapidly as unfermented samples. Fermented samples to which fructose or glucose is added darken at almost normal rates.

Production of Furfuraldehydes

Spectrophotometric analysis of extracts from stored apricots reveals the production of substances having characteristic absorption maxima at 280 to 285 mμ and a minimum at 240 to 250 mμ. These substances have been identified as furfuraldehydes. The addition of hydroxymethylfurfural to an apricot syrup increased the rate of darkening. Evidence has been obtained to indicate that furfurals are important intermediates in the browning reaction. As long as these substances are removed by continuous extraction with ethyl acetate, darkening proceeds at a slow rate; when extraction is discontinued, darkening is accelerated.

The Sucrose Industry

During the manufacture of cane and beet sugar three main types of colouring matter are formed by chemical reactions, all of which contribute to non-enzymatic darkening: (1) caramel substances, consisting of complex sugar anhydrides; (2) melanoidins, formed by the effect of heat on the initial condensation products of reducing sugars with amino acids and their amides; (3) iron compounds of polyphenols. The various individual substances present in cane and beet juices that take part in these reactions, the role played by each, and the course of the reactions during the process of sugar manufacture were discussed by F. W. Zerban.

The dark colouring matters formed during the process have several detrimental effects: dark colour in most syrups sold for food purposes is objectionable and lowers their monetary value; the colouring matters tend to slow up the crystallisation of the sucrose and to be adsorbed by the crystals, thus yielding inferior sugar; the reactions proceed during the storage of syrups and molasses, and the resulting sugar decomposition causes commercial losses; the formation of melanoidins is an important factor in "froth fermentation" of massecuites and molasses, another source of economic losses through sugar destruction; both caramels and melanoidins reduce Fehling solution and are therefore paid for by distillers at the same rate as reducing sugars, but they do not yield alcohol upon fermentation; the colouring matters are optically active and hydrolysed by acids, and because of this and their reducing power they cause errors in the analysis of sugar products. Various methods are used to reduce the formation of these colouring matters during the manufacturing process, or to remove those already formed; these methods, chemical or physical in nature, were described.

Potato Chips and Dehydrated Potatoes

As an adjunct to more time-consuming procedures for investigating the deterioration of dehydrated potatoes during storage, the potato chip technique offers the advantages of rapid enzyme inactivation, rapid dehydration, and accelerated ageing (browning), it was pointed out by A. R. Patton and W. E. Pyke.

The fluorescence of pigments extracted from potato chips, dehydrated potatoes, and sugar-amino acid systems varies with the pH of the fluorescent solution. The similarity of curves obtained with pigments from potato chips and dehydrated potatoes suggests that the nature of the browning is similar in both products.

The reactants responsible for browning are readily extracted from thin potato slices by hot water. Potato chips made from hot-water-extracted slices are white. Immersion of extracted slices in a pre-dip containing hot-water extract, previously

concentrated, replaces the reactants and restores the original browning.

Analyses of the potato extract indicate the presence of considerable amounts of reducing sugars and amino acids. If hot-water-extracted slices are immersed in a solution containing glycine and glucose, subsequent frying produces browning. Other amino acids in solution with glucose also produce browning. Other reducing sugars may replace glucose in the browning reaction. In no case has any sugar or amino acid produced browning when used alone.

Dairy Products

An interesting paper was presented by J. P. Kass, who said that browning in dairy products was a composite of several reactions among the reducing sugars, the proteins, the milk salts, and the atmosphere, its nature depending upon the concentrations of the reactants and in part upon whether it is induced by heat or storage. The colour of sweetened condensed milk develops progressively with the inversion of the cane sugar, while the discoloration of powdered whey and dried skim milk is markedly accelerated by storage at temperatures over 30° C. and relative humidities of over 30 per cent. The oxidation of certain added anti-oxidants is a contributing but unrelated factor in the discoloration of prepared ice cream mixes.

The browning reaction is a complex function of time and temperature, and at certain stages appears to be autocatalytic. It is characterised by the development of acidity, fall in *p*H and oxidation-reduction potential, comparatively slight loss of copper-reducing ability, an appreciable but constant conversion of aldoses to ketoses, and pronounced loss of optical activity. The coloration is a logarithmic function of the amount of lactose optically inactivated, the latter being directly proportional to the initial concentration. The colouring matter is adsorbed by the casein, but the discoloration cannot be directly related to the formol titre or the amino-nitrogen, and the racemisation curves of casein precipitated from raw and browned milks are identical.

The nature of the reactions will be discussed in light of the fact that they can be duplicated in non-nitrogenous systems and the discoloration can be inhibited by formaldehyde or bisulphite and discharged with bromine.

Trioses in the Maillard (Browning) Reaction

The significance of the trioses in the Maillard (browning) reaction was discussed by J. C. Speck, Junr., and C. D. Ball.

The formation of humic substances from the reaction of pyruvaldehyde with amino acids, as well as the identification of pyruvaldehyde as a product of the fragmentation of reducing sugars, has indicated that the trioses, glyceraldehyde and dihydroxyacetone, may be intermediates in the Maillard reaction. This hypothesis is supported by the observation that amino acids catalyse the conversion of both glyceraldehyde and dihydroxyacetone to pyruvaldehyde under conditions in which melanoidins are formed.

The formation of the trioses from pentoses and hectoses may be imagined as a process requiring a reverse aldolisation. For example, in the case of D-arabinose this would result in the production of glycolaldehyde and D-glyceraldehyde, or, if the scission were preceded by an Amadori reaction, in the formation of glycolaldehyde and dihydroxyacetone. It has been found that glycine markedly catalyses a reverse aldol condensation with diacetone alcohol. Hence it seems reasonable to expect a similar catalysis of such a reversal with the reducing sugars.

It is noteworthy that biacetyl has been isolated upon distilling solutions of hexoses or pentoses and amino acids. The mechanism of its formation is obscure. This substance also can contribute to the Maillard reaction, although its effect is less pronounced than that of pyruvaldehyde.

Vegetable Anhydration

A DETAILED description of the plant required for, and method of production of, anhydrous vegetables claimed to be dehydrated twelve times as quickly as the normal dehydration process, appeared in *Food Industries*, **17**, p. 1450.

The plant is manufactured as a complete unit, the most original part being the dehydrator itself. This is a multiband drier with six motor-driven stainless steel mesh bands arranged one above the other, the whole arrangements being enclosed in an outer casing. Over the surfaces of the first five bands are suspended radiation heaters maintained at 650° F., and these radiate heat down on to the vegetable slices carried along on the band. The bands also slide over metal plates maintained at 300° F., thus supplying heat to the vegetables by conduction (the temperatures given relate to carrot slices). Lastly, hot air (initial temperature 450° F.) is blown at 1,500 ft. per minute over the bands in the same direction as the product moves.

The sixth band is essentially a finishing zone, in which differences in moisture content between one piece of vegetable and another are evened out and drying is completed. There are four sub-zones in the sixth belt—a zone of still air and three of alternate vigorous and gentle air currents. The temperature is about 170° F.

Impartial observations on the quality of the vegetables produced by the drier have yet to be made.

Ministry of Food

Latest Statutory Rules and Orders

The list given below is the continuation of the list of Orders published in *Food Manufacture*, September 1, 1946, page 387.

No.	*Date.* 1946.		
			PRICE FIXATION ORDERS
806	June	4.	Order amending the Fish (Control and Maximum Prices) Order, 1946.
847	,,	20.	Order amending the Cereal Breakfast Foods (Control and Maximum Prices) Order, 1945.
862	,,	17.	Order amending the Eggs (Control and Prices) (Northern Ireland) Order, 1944.
880	,,	21.	Eggs (Control and Prices) (Great Britain) Order. Revokes S.R. & O. 1944 Nos. 502, 874; 1945 Nos. 272, 302, 645.
944	,,	25.	Directions supplementary to the Milk (Control and Maximum Prices) (Great Britain) Order, 1945. Revokes S.R. & O. 1946 No. 473.
959	,,	27.	Order amending the Milk (Control and Maximum Prices) (Great Britain) Order, 1945.
1071	July	9.	Raw Cocoa (Control and Maximum Prices) Order (West African beans). Revokes S.R. & O. 1940 No. 1458; 1941 Nos. 214, 865.
1107	,,	12.	Order amending the Pulse (Control and Prices) Order, 1943. (Green split peas.)
			BISCUITS
1095	July	11.	Biscuit (Charges) (Amendment) (No. 2) Order. [Emergency Powers (Defence) Act, 1939, s.2, Supplies and Services (Transitional Powers) Act, 1945, s.5.]
			CANNED FOOD
1078	July	10.	Order amending the Canned Fruit and Vegetables Order, 1946. (Potatoes, bottled fruit, and tomatoes.)
			FEEDING STUFFS
1261	July	25.	Feeding Stuffs (Maximum Prices) Order. Revokes S.R. & O. 1943 No. 1497; 1944 Nos. 313, 797, 1349; 1945 Nos. 878, 1472; 1946 No. 661.
			FLOUR
1155	July	20.	Order amending the Flour Order, 1945. (Quantities less than 3 lb.)
			FRUIT
1070	July	9.	Plums Order. Revokes S.R. & O. 1945 No. 785.
			POINTS RATIONING
804	June	4.	Points Rationing Order. (Dried Egg.)
848	,,	18.	Order amending the Rationing (Personal Points) Order, 1945. (Increase to 14 points ration.)
866	,,	18.	Order amending the Food (Points Rationing) Order, 1945.
			POTATOES
1166	July	18.	Order amending the New Potatoes (1946 Crop) Order, 1946. Revoked by S.R. & O. 1946 No. 1259.
1259	,,	25.	1946 Crop (No. 1) Order. Revokes S.R. & O. 1946 Nos. 653, 1166.
			RATIONING
852	June	17.	General Licence under the Food Rationing Orders, 1945-1946. (Additional sugar.)
967	,,	28.	Order amending the Meat (Rationing) Order, 1945. (Seamen's ration.)
1099	July	12.	Food Rationing (General Provisions) Order. Revokes S.R. & O. 1945 Nos. 861, 863, 864, 865, 866, 891, 1048, 1138, 1143, 1261, 1407, 1514, 1681, 1682; 1946 Nos. 9, 158, 280, 283, 449, 589, 601, 691, 733, 804, 848, 852, 866, 967.
			RESTAURANTS
768	May	30.	General Licence under the Meals in Establishments Order, 1942. (Victory Day.)
1132	July	12.	Meals in Establishments Order. (Bread, Private room charge.) Revokes S.R. & O. 1942 Nos. 909, 1494, 1821; 1943 No. 628; 1945 No. 101; 1946 No. 359.
			SOFT DRINKS
945	June	26.	Soft Drinks Order. Revokes S.R. & O. 1943 No. 838; 1944 No. 209; 1945 Nos. 244, 1322.
			STANDARDS
1221	July	24.	Order amending the Food Standards (Preserves) Order, 1944. (1943 No. 1553) (Grapefruit marmalade).
			WELFARE FOODS
1148	July	19.	Welfare Foods Order. (Milk, orange juice, vitamins.)

Asparagus, Past and Present

M. SCHOFIELD, M.A., F.R.I.C.

Those bundles of purple-tipped asparagus, sold this year in London shops at a figure beyond the purse of Mr. Everyman, constitute a vegetable as striking in history as in price. The Romans began it ; the Greeks had a say in it ; and England in the sixteenth and seventeenth centuries took up the tale, with such men as Evelyn and Pepys adding their touches to prove that classical writers were not the only ones occupied with thoughts of the kitchen. Moreover, English asparagus growing is of special interest with the great decline of the London cultivation areas—when more "planning" meant less asparagus—in contrast to the rise of the Vale of Evesham and its Worcestershire environs.

THOUGH that Roman statesman and first Roman historian, Marcus Porcus Cato, set himself to check the luxury and extravagance of public life, he was not averse to a full-length discourse on asparagus cultivation in his *De Re Rustica* (*circa* 161 B.C.). Treating no subject "with greater care," if we are to believe Pliny, Cato recommended the growing in reed beds or in trenches. Cultivation in the first year required "much manure" and protection from severe winter by use of straw. In the spring of the third year plants must be set fire to like reeds, we are told, so that they will thrive the better. No soil was more favourable than that in the gardens of Ravenna, superseded as favourite site by the Isle of Nesis off the coast of Campania, and, later still, by Cremona.

In tracing such early classical chapters to asparagus cultivation and consumption, one must be wary of certain types of wild asparagus; for wild forms are to be expected since there are about 120 species of *Liliaceae*. Such a wild type, known today as *Asparagus officinalis var. prostratus*, can be seen on Asparagus Island off the Lizard, in the Channel Islands, and occasionally in Wales. Such types must not only have been known but eaten in classical days; for Juvenal, in his eleventh Satire, refers to one as a dish at his feasts; Pliny likewise refers to a wild variety growing on the plains of Upper Germany, a "weed" which Tiberius Caesar mentions as strongly resembling asparagus.

Roman methods of cultivation were adopted in this country; their rivalry in betting at dinner parties as to who could grow the largest size sticks was also taken up by Evesham growers of the last century. In 1856, for example, John Huxley with his one hundred heads of asparagus weighing 20½ lb. won two sovereigns from John Grove with his heads weighing one pound less.

Origin of Cultivation Methods

After the classical period there is almost a blank in asparagus history until its cultivation came *via* travellers. A painting (*circa* 1608) from the Antwerp school of Rubens, in which Frans Snyder was understudy, shows asparagus much as we know it today, with partly blanched sticks and purple and green buds. From France, a country with much to say regarding asparagus, must have come the methods of cultivation, though earlier than with those Huguenots driven by the Revocation of the Edict of Nantes to this country. These refugees brought much skill in glass-making and iron-smelting, and certainly were responsible for the market gardening systems which sprang up to give us asparagus among other vegetables. But before they came asparagus had been grown in Vauxhall Gardens, as told us by the genial Pepys, who bought "a hundred of sparrow grass" in Fenchurch Street for eighteenpence. If one great diarist tried it, why not the other? So John Evelyn, living at one period at Deptford soon to become famous for asparagus cultivation, and noted for his more exact studies on agriculture, tried a nutritional maxim hardly acceptable to-day:

"Next to flesh, nothing is so nourishing as Asparagus." With over 90 per cent. water content, asparagus has no more claim to such virtue than it has for its asparagine, that widely distributed base in the vegetable kingdom, which Vauquelin and Robriquet discovered in young asparagus shoots.

Hypothetical claims and theories on asparagus vary from the idea that it is a cure for toothache to old Discorides' assertion that a crop can be started by pounding rams' horns and burying them in the ground. The *gourmet* after a substantial banquet (when such junketings come again!) will be more interested in the claim of that King's Physician, M. L. Lemery, in his *Treatise of all Sorts of Foods, both Animal and Vegetable: also of Drinkables*: "The essential Salt which is contained in Sparagrass in a sufficient quantity, is very proper to penetrate into all the Recesses of the Parts, there to dissolve the glutinous and embarrassing substances they meet with, and to make a passage into all the Pipes, by breaking and removing the Obstacles that are in their Way. Sparagrass in Latin is called Asparagus, *ab Aspergendo*, 'sprinkling,' because 'tis convenient to water them."

English Cultivation Areas

Though it was for large private houses that "sperage" or "sparage" was first cultivated in England, a good crop was sold on the Central London Market in 1680. This early appearance was the forerunner of good marketable crops from the light soils on the Surrey side of the Thames Valley; from Sandwich in Kent, and from Colchester and Rainham. But Battersea, Wandsworth, Mortlake, and Deptford had become most flourishing market garden areas towards the end of the eighteenth century. Battersea took the lead with 260 acres of market gardens, chiefly asparagus and cabbages; Mortlake had some 60 acres of asparagus alone; and Deptford at one period went one better with 80 acres. The rich alluvial soil around London, according to the National Encyclopaedia published in 1870, could give such crops as 110 heads weighing 32 lb. (this referred to a year earlier than 1870). Battersea deserves special mention because of the spur given to growers elsewhere. For example, in the 1799 catalogue of the Evesham Horticultural Society one hears of a James Bigg of Worcester having some very fine roots of Large Green Battersea asparagus, a type in which Bigg specialised year by year.

The Battle of Battersea for pride of place was soon to be lost, however. Built-up areas cropped up instead; in 1848 the opening of Battersea Park meant the end of asparagus-growing. And while asparagus cultivation was to appear later at H.M. Gardens at Frogmore, at Zion House Gardens, and in Cornwall, it is to Evesham one now turns to lead British cultivation. One sees Evesham today as one of the very few districts entirely dependent on the soil in which a steady growth of population in the twentieth century can be traced. Vegetables and fruit cultivation, with its famous plums more prominent than any other fruit, with bush fruit under the young trees, and spring salads and flowers between them: such is the Vale of Evesham after a century of growth, apart from its equally famous asparagus. In 1810 Pitt in his *Agriculture of the County of Worcestershire* noted seeing several flats of asparagus in the county. The early success of James Bigg given above was followed in 1830 by the award of a Royal Horticultural Society medal to Anthony New for his fine specimens of asparagus at the Vale of Evesham Society's show, and for his communications to the R.H.S. on asparagus cultivation. Three years later the Evesham Society had divided asparagus into two sections: Red Asparagus and Green Asparagus.

The Vogue Spreads

After Bigg and New came such enthusiasts as Reynolds, who could sell 100 heads weighing 28 lb. at the Worcester Market for two guineas; and James Myatt, pioneer of market gardening by improved methods and on a field scale, who took a lead in Evesham asparagus cultivation. Cultivation spread to Hampton, Bingeworth, and Badsey about 1875, and to Hinton-on-the-Green and Childs Wickham later; yet the heavy soils around Evesham itself (in contrast to London's lighter soil) maintained the industry within bounds. Total acreage rose to 1,500, with Badsey's share of over 100 acres in prominence.

In taking the leading place in the country, Evesham was not immune from pests and other troubles. As early as 1840 the asparagus beetle was reported on the warpath; in the 1890's and early this century rust caused sufficient damage to lead to the ploughing-up of scores of acres; later still "asparagus sickness" was in evidence and was traced to the fungus *Rhizoctonia crocorum* by Long Ashton workers. A strain known as Palmetto seemed to be immune to rust. But growers maintained this to be inferior to old Evesham "grass" ("grass" it is today, the term "asparagus" being reserved for highbrows!).

Though with plum-growing in such prominence there has been some decline to approximately 1,000 acres in recent years, those families born and bred to asparagus cultivation keep their faith. Asparagus is such a fast grower, especially in hot weather when a whole cutting might "run away" in a day or two, that a man and his family are hard put to it to manage more than one acre.

French asparagus will again offer competition on the London market. But apart from the heavy tariff which has protected home growers, good transport has enabled growers to cut crops one day and have them on sale the next—an essential for asparagus at its best. After the second year of

planting, shoots of half an inch diameter should be ready to cut from, the usual average market length being six inches below ground and two inches above. Experience enables cutters to sever the hidden sticks at the right point; the harvest is sent to the depot for classifying into "super-selected," "selected," "choice," and "crude," all of the right length for particular bunches; and then follows packing in crates or pot-hampers for inferior grades. The rule is that all asparagus should be cut by June 26, after which the plants are permitted to grow in the sun until autumn, after which they are cut down and the ground levelled. The value of the Evesham crop may reach £100,000 in normal years, a figure which might well be increased when it is known how to recognise the male species in the root or seed. The female plant becomes richly berried and is used for autumn decoration.

Today there are enthusiasts following James Bigg, Anthony New, and Reynolds: enthusiasts like Mr. C. A. Binyon of Badsey, and Mr. F. Bicknell, Secretary of the Evesham Growers. And in normal years there has been the stimulus of the asparagus luncheon of the Wine and Food Society at the Lygon Arms, Evesham.

Asparagus at the table has involved recipes going back 250 years. The French in particular have been in prominence ever since the publication in 1758 of *Le Dons de Comus* with its recipes for *Asperges au beurre, Asperges à l'huile, Asperges au jus*, and many others. Our pioneer Hannah Glasse, at war with those French cooks, had her toasted rounds dipped in asparagus liquor, a little butter on the toast, and then asparagus all around the dish with their white ends outward. As for our Dr. Kitchener, who believed in filling the plates and sending them round instead of making civil faces at your guests, he would have no one put butter on asparagus. Put white sauce on it, or "send it up in a boat" was all he considered necessary.

The Chemistry of Foods

In these days of specialisation advances are being made in every branch of chemistry with almost bewildering rapidity, and the chemistry of foodstuffs is no exception. On the analytical side alone method follows method in such rapid succession that the subject has already subdivided itself into fairly well-defined, specialised sections, each dealing with a group of closely allied products. The analyst engaged in the examination of foodstuffs in general is faced with the problem of selecting a well-tried analytical method for a particular article from a number of methods, each claiming some advantage over the others.

To prepare a laboratory handbook to assist such a worker is a difficult task if the volume is not to become unwieldy in size. Furthermore, the more the size is reduced the easier it becomes to criticise the book on the grounds of omission of this or that method of analysis. There will, however, always be a demand for a concise and compact laboratory handbook which covers the subject of foodstuff analysis as well as possible within the limitations imposed by considerations of space. This is shown by the appearance of a third edition of a useful book.* The chapters deal with the subjects in the following groupings: Sugars, syrups, treacle, honey, jam, and marmalade; starches, cereals, flours, bread, custard and blancmange powders, soya meal; baking powder, golden raising powder, eggs, liquid and dried eggs; fruit, vegetables, dried fruits, tomato *purée*, lemonade, lime juice, fruit syrups, etc.; tea, coffee, coffee essences, chicory, cocoa, chocolate, cocoa butter; mustard, pepper, cayenne, ginger, spices, and curry powder; wines, British wines and cordials, brandy, whisky, rum, gin, beer, cider, and vinegar; flesh foods, meat, sausages, potted meats, meat extract, gelatine, isinglass; milk, cream, condensed milk, dried milk, infant foods, casein, malted milk; butter, margarine, and cheese; lard, suet, salad, and other oils; determination of the fat-soluble vitamins. In an appendix are given the Preservative Regulations and tests for prohibited colouring matters.

Standard analytical methods for the examination of all these substances are described concisely yet with sufficient working detail to enable those unfamiliar with the techniques to perform the analyses.

One or two passages in the book are somewhat obscure—*e.g.* on page 15 the description of the treatment of the copper oxide obtained in sugar determinations could, with advantage, be rewritten to improve clarity. In the determination of cocoa in blancmange it is not until the end of multi-operational analysis is reached that the reader is aware that theobromine is being determined and from this cocoa. The method could be read more intelligently first time if this was clearly stated at the outset.

The author does not deal with food microscopy, but refers readers to standard works on the subject. Dealing with starches on page 50, he states, ". . . it is much better to compare samples with known specimens of the various starches themselves than to rely upon drawings or illustrations"—an extremely sound statement. However, the author then allows himself to be drawn into a description of the various starches, poorly illustrated with line drawings. These seven pages could well have been omitted and reference made to standard works on the subject, or replaced by a description of the preparation of comparison samples of the various starches.

* *The Chemical Analysis of Foods*. By Henry Edward Cox, Ph.D., D.Sc.(Lond.), F.R.I.C. Third Edition. Pp. 317. London. 24s. net

Dextrins are best mounted in glycerol-water mixtures and not in water, as the text would lead one to infer. The determination of shell in cocoa might have been better done, and the fat content of cocoa nib is given as about 50 per cent., whereas a more usual figure these days is about 55 per cent.

The section on oils contains no mention of fluorescence tests, which have proved so useful; nor is this method of testing dealt with anywhere in the book, yet its value in food analysis cannot be disputed.

The essentials of the comprehensive scheme of J. R. Nicholls for the detection of prohibited colours in foodstuffs are given.

In referring readers to the late Professor Green's book for necessary tests for identifying dyestuffs in general, a warning that dyestuff identification is a problem for the specialist would not be out of place, in view of the small quantities present and the varying mixtures of differently behaving isomers often present in "single" dyestuffs.

There are signs throughout the book that much of the material in the earlier editions has been retained without too critical a review of later work. Many of the references are over twenty-five years old, and it appears desirable to include analytical figures, obtained by using more recent methods, in some of the tables in the next edition. One "hang-over" from the first edition occurs on page 120—"a case recently reported . . . (*Z. Unters. Nahr. Genussm.*, 1922, **44**, 89)."

The book is remarkably free from misprints and, with the very few minor exceptions noted, lucid and easy to follow. As stated above, the smaller the volume on a big subject the easier it is to criticise omissions, and the few points noted above compared with the scale of the subject illustrates how well Dr. Cox has accomplished a difficult task. —J. A .R.

Fruits and Vegetables

SIGNALISING the beginning of the change over from war-time activities to a peace-time programme, the Long Ashton Research Station Report for 1945 contains papers on fruit and vegetable culture, plant pathology, and fruit and vegetable products.

In the studies relating to mineral deficiencies, E. J Hewitt's report describes improvements in the sand culture technique for the study of trace elements. Boron and iron deficiencies were studied in a number of crops, and manganese toxicity was proved an important factor in the injurious effects produced by acid soils. D. J. D. Nicholas gives further results relating to tissue test methods for the rapid determination of mineral deficiencies. Several of the chemical standards were given numerical values and the relationships between stages of growth and tissue test values were elucidated. A portable outfit was designed, suitable for making chemical tests under field conditions. D. J. D. Nicholas, J. O. Jones, and T. Wallace confirm the finding that magnesium deficiency of tomatoes can be remedied by repeated sprayings with magnesium sulphate solution. A good commercial control also resulted from a soil dressing of 1 ton Epsom salts per acre at planting. Manurial experiments on potato and beet by T. Wallace and E. Catlow prove that stable manure is too low in nitrogen for these crops, and also that the continued use of inorganic fertilisers of the N, P, K type may result in acute magnesium deficiency. This deficiency is also induced by low nitrogen or by high potassium sulphate.

A comprehensive review of the requirements of hydraulic spraying machinery for fruit crops is presented by H. G. H. Kearns. A scheme of classification for spraying machines is proposed and tentative specifications for pumps and accessories are listed. These are submitted as a general guide for potential manufacturers and purchasers of fruit-spraying equipment. H. G. H. Kearns, R. W. Marsh, and H. Martin report on experimental spraying programmes on apples, using D.D.T. and certain organic fungicides. The outstanding result was the high level of control of leaf-curling aphis secured by a D.D.T. application at the pink bud stage. The organic fungicides (Formate and T.M.T.D.S.) proved less effective than lime sulphur in scab control.

In two papers B. T. P. Barker and L. F. Burroughs establish the fact that cider fruit of high vintage quality can be produced on bush trees well within ten years from planting—a result very pertinent to the problem of the present shortage of raw material for the English cider industry. While each variety in these trials maintained its characteristic vintage characters, the influence of locality was impressed on the samples from the respective centres. Rootstock effects have not so far become apparent. The same authors detail a standardised technique for small-scale cider-making and for "critical sampling" of ciders. B. T. P. Barker also surveys the chemical, nutritional, and microbiological factors concerned in normal cider fermentation and in the onset of cider disorders, and describes an example of the non-development of acetification in certain bottled ciders after opening.

A. Pollard, M. E. Kieser, and J. D. Bryan find that fresh culinary and cider apples are fairly good sources of vitamin C, certain cider varieties being little inferior to citrus fruits in this respect. The same authors show that glasshouse tomatoes are inferior to outdoor tomatoes in vitamin C content, but superior in sugar, acid, and flavour.

A. Pollard, M. E. Kieser, B. A. Crang, and T. Wallace confirm the finding that quality in potatoes is largely governed by site; manurial treatments produce only limited effects, but correction of definite deficiencies can give some improvement.

The Bread and Flour Confectionery Industries

As a result of the invitation of the Ministry of Food, a conference of representatives of the bread and flour confectionery sections of the baking industry was held on March 1, 1944, when the subject of post-war planning was discussed.

The Committee subsequently formed met on some twenty occasions. The terms of reference given to the Committee were as follows: The Committee will submit to the Ministry of Food suggestions for—

(1) The immediate post-armistice period, when minor restrictions of control, such as it might be difficult to justify under other than war conditions, might be removed.

(2) The mid-term period when progressive steps might be taken to effect general decontrol coincident with improvement in supplies.

(3) The long-term policy—involving measures to be adopted as a permanent part of the nation's food policy. (This will involve the maintenance and improvement of nutritional standards to secure an adequate and balanced diet, and measures for increasing efficiency in food production and distribution.)

Previous Reports

On September 12, 1944, the Committee presented the first report to the Ministry of Food dealing with the immediate post-armistice period, which made recommendations in regard to (1) man-power, (2) bakery plant and machinery, and (3) the removal of minor restrictions.

On May 10, 1945, the Committee presented a second report, which had reference to, and made recommendations covering, the intermediate period of about two years following the end of the war.

The final report,* dated August, 1946, has now been published and includes the recommendations made in the earlier reports, qualified where necessary by events which have transpired in the meantime.

Future Outlook

The earlier reports were concerned mainly with the existing war-time conditions and suggestions for the removals of controls from the baking industries. In the final report an endeavour has been made to look further ahead in the future and to put forward suggestions thought to be of value to the industries and the community when the present emergency conditions come to an end. Among the conditions looked forward to are increased production of essential plant and machinery and facilities for acquiring these. Regret is expressed that it was not found possible to adopt the Committee's recommendations for the establishment of a controlling authority, on which the baking industries would be adequately represented, to ensure the orderly and equitable allocation of plant and equipment to the industries. Stress was laid on the shortage of skilled workers and the importance of their release from the Forces and other work as soon as possible.

Allocation of Ingredients

The report states that while the period of shortages continues the baking industry should be used as the principal means for the equitable distribution of increased supplies of sugar, fats, fruit, preserves, and chocolate. Their use in cake and flour confectionery provides a means of distributing them in a way that is not only attractive but equitable and nutritious. It was recommended that control of the allocation of ingredients by the Ministry be removed as soon as supplies approximate to demand.

Importation of Flour

Problems of the supply of imported flour have been carefully considered, and the opinion is expressed that an unrestricted supply of imported flour should be made available to the baking industries. For certain types of bakery goods strong flour, while for other bakery goods medium or weak flour, is needed, and the quality of the product is adversely affected if bakers have to use unsuitable flour, or if the strength of the flour used for particular products varies. Canadian and Australian flours are milled in huge quantities, and as a result they are uniform in type and their characteristics are well known to bakers. It is considered that the suspension of the free market which existed before the war should be regarded as one of the restrictions to be removed as soon as possible.

Among other recommendations in connexion with flour supplies were that the provisions of Part IV of the Flour Order (S.R. & O. No. 1, 1945), requiring flour buyers to register with suppliers, be brought to an end as soon as possible. Also that the restrictions on flour supplies to the baking industries in Northern Ireland be removed. Other restrictions urged to be abolished were those on the shapes, slicing, and wrapping of bread and of confectionery ingredients.

Nutrition and Flour Confectionery

The definitions arrived at by the technical subcommittee which was appointed are set out in the report, these including the quality of ingredients of flour, sugar, oils and fats, eggs, fruit, etc.

Other matters which were examined and commented on in the report were labelling, research, education and training, and matters concerning personnel.

* *Final Report*. The Bread and Flour Confectionery Industries' Post-War Planning (Drafting and Liaison) Committee. Pp. 11. London. 6d. net.

Biscuit Distribution

THREAT OF NATIONALISATION

Denouncing the threat of nationalisation of transport, Mr. Rupert Carr, managing director of Peak, Frean, and chairman of the Biscuit Delivery Pool, speaking at the recent winding up of the wartime pool, said that it was difficult to feel confident that the essential transport needs of the biscuit industry would be so well catered for in the future as they had been in the past, with consequent loss of efficiency and deterioration of service to customers and public. Biscuit traders should be left free to organise their transport arrangements to meet the special needs of their industry with the maximum of efficiency.

Two of the features which made the distribution of biscuits a specialised service was the necessity for segregation so as to avoid contamination and the necessity for a minimum amount of handling to avoid damage and deterioration. The provision of this service entailed specially constructed vans with empties compartments and the employment of skilled driving personnel who had an intimate knowledge of the biscuit trade's practices.

Mr. Carr added that whatever might happen regarding the proposal for nationalised transport, or whatever might be the outcome of the agreement recently reached between road and rail interests, the biscuit industry must strive to secure freedom to select the mode of transport best suited to its requirements.

Indian Visit

Mr. Norman C. Fraser, M.A. (Cantab.), A.M.I.Chem.E., accompanied by Mr. C. N. Hillier, B.Sc., A.M.I.Chem.E., of W. J. Fraser and Co., Ltd., is making a business trip to India, and will be glad to contact those interested in complete installations for the production of edible oils, soap, glycerine, fatty acids, and general chemicals. Interested manufacturers should address enquiries c/o Mercantile Bank of India, Ltd., at Delhi, Bombay, Madras, and Calcutta. This visit will last for a period of approximately six weeks.

Obituary

The death has taken place of Mr. Thomas Flynn, of Dungarvan, County Waterford. He was a director of Clover Meats, Ltd., of Waterford.

Dry Fruit Cleaners

Based on fifty years' experience, Caleb Duckworth, Ltd., are producing four models of dry fruit cleaners with a machine to suit the requirements of all dried fruit users. One model cleans currants and sultanas equally well with a capacity of 1 ton of free currants or 15 cwt. of sultanas per hour, sticky fruit reducing the output somewhat. The fruit is automatically broken up and fed into revolving conical wire-mesh cylinders, inside which rubber fans rotate at high speed in the opposite direction. Dirt, stalks, grubs, and nails are removed most efficiently without crushing or wastage to the fruit. Two other power models are listed, one automatically fed, one manually fed, with capacities of 5 cwt. of currants or 3½ cwt. of sultanas per hour. The fourth model is a small hand machine for the retail baker.

Silver Jubilee

An interesting little booklet of thirty-two pages, issued by the British Legion on the occasion of its Silver Jubilee, gives some idea of the British Legion and the part it plays in the life of the ex-Service community and of the nation as a whole.

Factory Trucks

For ease of handling manufactured goods or for use in the processing of raw materials for manufacture the Collis truck, used in conjunction with the platform system, is an invaluable aid to operatives in the food industry. Made in either the all-hydraulic type or the assisted-leverage type, the range of models available covers loads from 5 cwt. to 5 tons.

Loads are stacked on the wooden platforms, the truck operator enters the truck under the platform, and with a few short strokes on the handle of the all-hydraulic type, raises the lifting handle to the under height of the platform. The load is then ready for towing. With the assisted-leverage type, the lifting frame is raised by one downward stroke on the handle.

The illustration shows the assisted-leverage type, with a lifting capacity of 10 cwt.

Acid-Resisting Cement

An acid-resisting cement used chiefly for bedding and jointing vitrified bricks and tiles in the construction of floors, walls, and tanks has been produced by J. H. Sankey and Son, Ltd. It is in the form of a fine powder, and has to be mixed with an acid-resisting solution giving an ideal plastic consistency, therefore easy to trowel and apply.

About twelve hours after application the cement sets to stone-like hardness, being dense and close in texture. Its tensile strength is high, its absorbency low, and there is no contraction, cracking, or crumbling. The cement resists all acids with the one exception of hydrofluoric, remains unaffected by temperatures up to approximately 1,200° C., is waterproof, and can be stored without deterioration for any length of time, provided it is kept in a dry, cool place.

Empty Biscuit Tins

All the principal biscuit manufacturers have entered into an agreement not to collect the empty biscuit tins of other manufacturers who are parties to the agreement.

A schedule of names of manufacturers who have entered into this agreement not to uplift other manufacturers' tins has been issued and is available to any interested distributor upon application to the Secretary, The Cake and Biscuit Manufacturers' Wartime Alliance, Ltd., 7, Park Lane, London, W.1.

Imperial Chemical Industries

The departments of the Southern Region Sales Office, which were left at Mill Hill, have now returned to London, where the main office has been located since July 22.

The Engineering Trades and Metals Departments will be at Gloucester House, 149, Park Lane, W.1 (Tel. Grosvenor 4020), on and from September 1. The other departments at Mill Hill, *i.e.* Agricultural, Dyestuffs, Household Products and Distribution, including Packages and Accounts, moved on September 13 and 14.

Corrosion-Resistant Alloy

Containing a high proportion of nickel, copper, and chromium, the corrosion-resistance of Ni-Resist is many times greater than that of ordinary cast-iron. A recently published pamphlet issued by the manufacturers, the Mond Nickel Co., Ltd., contains details of the use of this alloy in handling sea and industrial waters, in sewerage disposal plant, and its resistance to alkaline attack and heat. The alloy has been of value in the food industry in replacing iron castings where corrosion or danger of contamination had previously arisen—in meat choppers, mincers, and in fruit and vegetable canning machines. In the dairy industry it has been employed for structural castings of bottle filling and similar machines.

British Industries Fair, 1947

The first British Industries Fair since 1939 is to be held from May 5 to 16 next year at Earl's Court and Olympia, London, and at Castle Bromwich, Birmingham.

As in pre-war years, exhibits will be grouped in two main sections—the lighter industries in London and the engineering and hardware at Birmingham. The London section of the Fair is organised by the Export Promotions Department, Board of Trade, 35, Old Queen Street, London, S.W.1, and the engineering and hardware section by the Birmingham Chamber of Commerce, 95, New Street, Birmingham, 2.

Special attention will be devoted to the display of United Kingdom products suitable for export, and it is hoped the Fair will attract many buyers from abroad as well as buyers in Britain.

Board Changes

The following changes in the boards of Ernest Scott and Co., Ltd., and George Scott and Son (London), Ltd., are announced:

Mr. Alex. Hutchison retires from the chairmanship of companies, Mr. W. Lindsay Burns becoming chairman and managing director. New appointments to the board are: Lindsay Burns, Junr., I. M. O. Hutchison, and H. D. Macmurray, B.Sc., A.R.I.C., A.M.I.Chem.E.

Patent Law Reform

Prepared by the Joint Chemical Committee on Patents, a Memorandum on Patent Law Reform has recently been published dealing with the reforms considered necessary in the Patents Acts, some fifty sections of which are affected.

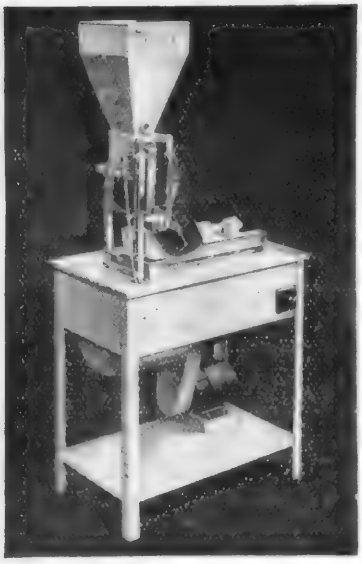
Mr. Frederick Sullivan

Mr. Frederick Sullivan, general sales manager for many years of Maconochie Bros., Ltd., has left on a tour of the company's distributing agents in Australia, New Zealand, Singapore, India, and Ceylon. He intends to be away about six months, during which time he will also investigate the widening of present markets.

Sugar-Dried Egg

Following research begun in this country during the war and continued in the Argentine and Canada, a new kind of dried egg has been introduced to the baking trade. Although not suitable for omelettes and scrambled eggs, it is described as equal to the best of fresh eggs for sponges and cakes. The egg pulp is mixed with sugar before drying, and this doubles the foam-making quality of the dried egg.

Lyons tea packets showing the new labels designed by Kathleen Darby.



Semi-Automatic Seed Machine

Recently developed by the Automatic Weighing and Packing Machine Co., the semi-automatic seed packing machine has more advantage over filling units, as the bags are fed and filled automatically and provision is made whereby the operator can damp the gummed flap, which can be readily sealed over while being removed from the conveyor. The output is forty per minute of finished sealed packets, and the plant is ideal where the completely automatic plant is too costly and elaborate.

Health Congress, 1947

The Royal Sanitary Institute will hold their 1947 Health Congress at Torquay from June 2 to 6, at the invitation of the Corporation. The Right Hon. the Earl Fortescue, Lord Lieutenant of the county of Devon, will be President of the Congress.

Fish Import Duties

The import duties on fresh fish and fresh shell fish were suspended by Import Duties Orders that expired on August 31, 1946. It had been decided that these Orders would not be renewed on expiry, and therefore the duties operated again from September 1, 1946.

OBITER DICTA

- Five per cent. inspiration and ninety-five per cent. perspiration is not a bad recipe for world prosperity.—*Sir Miles Thomas.*
- There is a certain snob value in dearer fish. Do you think I could ask visitors to tea and give them herring? — *Leeds housewife.*
- To speculate on the effects of the estimated increased wheat supplies from Canada would be as idle as crystal gazing—*Mr. Strachey.*
- You will put every dabbling grain exchange out of business in Chicago, Winnipeg, and Liverpool. We've got to.—*Mr. La Guardia in Copenhagen.*
- It is late in the day that the Department of Health should be giving serious consideration to the ice cream question—*Dr. J. Kelman, County Medical Officer for Health, Perth.*
- The Black Market will end only when the people themselves rise in revolt against it—that is already being proved from our experience.—*Chairman of Hackney Borough Council.*
- We don't want to stop people selling ice cream or buying ice cream, but we do want to see it is made under proper conditions. —*Chairman of the Wandsworth Council Public Health Committee.*
- I'm a lawyer, and if I were able to keep up with all the Ministerial orders which come out then I would be Prime Minister with a halo around my head.—*Solicitor at the Alford Police Court.*
- Maybe proper indoctrination will convert us all to universal taste. Maybe my wife will soak a tin of dehydrated fish *de luxe* for half an hour and confront me with an octopus. But not if I know it.—*Ritchie Calder in the "News Chronicle."*
- We do not contend that a higher living standard will of itself guarantee the peace, but we do believe that it will create a climate conducive to preservation of peace in the world.—*Assistant Secretary of State for Economic Affairs, U.S.A.*
- I discovered a lady in the West End licking her fingers after picking up and putting down chocolate buns. Examples of this sort are not only objectionable, they are filthy. With pats of butter it is just the same—people picking them up and putting them back.—*Dr. Mont Follick, M.P.*

Mr. E. G. Purser

Mr. E. G. Purser, B.Sc., F.R.I.C., has resigned his position as chief chemist to Allied Bakeries, Ltd., London, and has taken up the appointment of general manager to the Eustace, Ltd., group of companies in Cornwall.

Change of Address

The address of the office of the Wages Councils, Road Haulage Wages Boards and Catering Wages Boards is now: Office of Wages Boards and Councils, Queen Anne's Chambers, 28, Broadway, London, S.W.1. Tel.: Whitehall 7010.

Return from America

Mr. J. F. Byrne, director of Paines and Byrne, Ltd., has recently returned from America, where he has renewed many business contacts in connexion with the manufacture of hormones, vitamins, agar agar, and catgut products. Mr. Byrne speaks highly of the friendly receptions extended to him and believes that considerable business, to the advantage of both countries, will result from his visit.

Cost Reduction

The fourth in a series of publications issued by McGowan, Perry and Partners, *Reducing Your Costs*, outlines the basis on which a programme to improve methods of costing must be founded.

Stating that the increased wage rates which have come as a result of the war can be passed on to the consumer in the form of higher prices, the authors stress the necessity of increasing production to offset this wage increase. The analysis of time and motion, which is an integral part of the scientific determination of standards, can establish considerable avenues by which savings can be effective. Such an analysis would not reduce costs, but would point the way in which economies could be realised.

The booklet gives various suggestions for cost reduction, and copies are available for interested executives.

Resumption of Trade with Austria and Hungary

Details with reference to the removal of trading with the enemy restrictions have been issued by the Board of Trade. Attention has been called to the Payments Agreement with Austria signed on July 31, 1946, which is now in force, and also to the following Orders:

Trading with the Enemy Authorisation (Austria) Order, 1946 (S.R. & O. 1373).

Trading with the Enemy (Transfer of Negotiable Instruments, etc.) (Austria) Order, 1946 (S.R. & O. 1374).

Trading with the Enemy (Custodian) (Amendment) (Austria) Order, 1946 (S.R. & O. 1375).

Trading with the Enemy Authorisation (Hungary) Order 1946 (S.R. & O. 1432).

Trading with the Enemy (Transfer of Negotiable Instruments, etc.) (Hungary) Order 1946 (S.R. & O. 1433).

Trading with the Enemy (Custodian) (Amendment) (Hungary) Order 1946 (S.R. & O. 1434).

Institution of Factory Managers

The Councils of the Institution of Factory Managers and of the Works Management Association have mutually resolved to form a new body to be known as the Institution of Works and Factory Managers. To this new body the members of the older bodies will be transferred, thus uniting forces and creating an organisation worthy of the personnel of works and factory management throughout the country. All formal matters are well in hand, and it is hoped to effect complete transference by November 30, 1946. The following papers will be read at future meetings:

October 2, 1946.—At the Midland Branch—Queen's Hotel, Birmingham—7 p.m.: "The Different Problems arising in the Management of Small and Large Factories." Mr. C. R. Jordan.

November 13, 1946.—At the South-East London Branch—Bonnington Hotel, W.C.2—6.30 p.m.: "The Future of the Small Factory in British Industry." J. A. Aplin, A.M.I.I.A.

The subject of Sir Henry Fildes' essay for a prize is: "Should Management 'Control' or be 'Controlled'?" Entries will be received up to October 31, 1946. Full details may be obtained from the General Secretary and Treasurer.

Flavours and Essences

Much progress has been made in recent years by Messrs. Ryder and Co. in the development of flavours and essences for the food industry.

By using the "cold pressed" method the full flavour of the juices from first-grade British fruit is retained. Where flavour extracts are required from beans, roots, herbs, etc., the latest vacuum digesters are used.

Essential oils from the principal producing centres in the world are blended at the factory for the production of flavours and essences.

Co-operation in producing flavours, essences, compounds, or colours to meet special requirements is undertaken by the manufacturers.

Appointment

Mr. Ian D. Patterson, chief chemist and development manager of the Goodyear Tyre and Rubber Co. (Great Britain), Ltd., from 1926 to 1937, has been appointed to the newly created post of assistant manager, chemical products division of the Goodyear Company at Akron.

Chief function of the chemical products division is to develop and apply new processes to new products that come out of Goodyear's research laboratory so that they can be placed in production.

Cow and Gate

At the thirty-seventh ordinary general meeting of Cow and Gate, Ltd., Mr. W. R. Bramwell St. John Gates (the chairman), presiding, said that the profit, after provision for taxation and deduction of debenture interest, amounted to £68,013; this compared with £63,856 for the previous year, which in that year was after making a transfer of £30,000 out of the year's profits to special provision for taxation.

SCRIBBANS AND CO.

STEADY PROGRESS

The nineteenth annual general meeting of Scribbans and Co., Ltd., was held on September 11, 1946, in London.

Mr. H. Oliver King (managing director) presided in the absence of the chairman of the company (Mr. Louis Nicholas, J.P., F.C.A.), through indisposition, and announced with regret the death of Mr. Henry Hathaway, J.P., who had been a director of the company since the inception.

The speech prepared by Mr. Nicholas stated that the trading of the company and its subsidiaries showed steady progress. That was a matter of satisfaction to the directors, as the year had been remarkable for the difficulties which the company had had to meet caused by the numerous restrictions on trading, shortage of supplies and labour, and the fact that the year had closed with a sharp cut in their supplies occasioned by the general shortage of cereals and fats. That cut would be reflected in the current year by a reduction in output. In addition, cake and flour confectionery was now rationed along with bread, and it was not possible to say at this stage what effect that would have on the company's sales, but the directors were taking all possible steps to meet the position.

The net profits of the company for the year, including dividends from subsidiaries, after providing for management, taxation, etc., available for distribution were £133,477, as against £110,348 last year. The directors had transferred to general reserve account £25,000 and £35,000 to development reserve account. In making those reserves the directors were bearing in mind the uncertainties of the future, particularly the need of strong reserves for rehabilitation after the war years to meet future competition and provide for the further development of the company. The directors recommended a final dividend of 3½ per cent. upon the Ordinary shares, making 6 per cent. for the year, as against 5½ per cent. last year, and a final dividend upon the Deferred shares of 9$\frac{11}{12}$ per cent., making a total distribution of 17 per cent., as against 15$\frac{7}{12}$ per cent. last year.

He would like to pay a tribute to the splendid services rendered by all their employees in every one of their companies.

Unfortunately, looking into the future, it appeared that further experiments in nationalisation were probable. Considering the absolute necessity for the recovery of industry, he regarded with regret the intention to nationalise transport. The intricate mesh of transport forming the supply system of all businesses should not, in his opinion, be disturbed, particularly while individual traders were straining every nerve to rehabilitate the industry of this country.

The report was adopted, and at a subsequent extraordinary general meeting a resolution was passed changing the name of the company to Scribbans-Kemp, Ltd.

The Metal Box Company

At the twenty-fifth annual ordinary general meeting of the Metal Box Company, Ltd., Sir Robert Barlow (chairman) presided. The balance of profit available was £264,210 as against £242,428 last year. The board has appropriated a further £75,000 to the development and reorganisation reserve, bringing this reserve up to £400,000. An interim dividend of 5 per cent. was paid on the ordinary stock on January 1, 1946.

The board has given careful consideration to the question of the distribution of profits to be made to the ordinary stockholders. For the past eight years the rate of distribution on the issued capital has remained unchanged. During this period, however, the conservative dividend and financial policy which has been followed has resulted in a considerable increase in the amount of capital actually employed, with a corresponding expansion of the company's business but without corresponding benefit in dividend to the stockholders. It is the directors' intention, when circumstances permit, to bring the issued capital more into line with the capital employed, and meantime they have decided to mark the conclusion of the company's twenty-fifth year by recommending that a special dividend of 2½ per cent. be paid on the ordinary stock, in addition to the usual final distribution of 12½ per cent. The company's profit depends upon the securing of a small margin on a large volume of turnover. The margin this year is rather less than 6 per cent. before excess profits tax and income tax.

McDougalls Trust

Mr. Kenneth A. E. Moore, chairman of McDougalls Trust, Ltd., speaking at the thirteenth annual general meeting, said that the margin of profit per unit of sales was somewhat lower owing to rising labour and other costs without any corresponding increase in selling prices, which continued to be controlled. However, the increased production and sales, coupled with a reduction from 100 per cent. to 90 per cent. in the effective rate of excess profits tax, produced a profit, subject only to income tax and appropriations, of £299,829, compared with £280,848 in the preceding year.

After making appropriations for staff bonuses and income tax and paying the same dividends as for many years past, £15,000 was added to reserve for future income tax and £25,000 to the advertising reserve, and the sum of £61,292 was carried forward as compared with £59,615 brought in.

The fact that the profits of McDougalls, Ltd., for the past year were maintained at a high level enabled that company to pay the same dividend to McDougall's Trust, Ltd. The directors of the latter company felt justified, therefore, in recommending the payment, for the tenth year in succession, of a dividend of 10 per cent. on its ordinary shares.

Lovell and Christmas

At the fifty-first ordinary general meeting of Lovell and Christmas, Ltd., Mr. J. G. Elliott, the chairman, presiding, said that from the directors' report and accounts for the year to June 1 last it would be seen that the profits for the year, including an amount transferred from the reserve for excess profits tax, were £185,298 17s. 7d. as compared with £178,555 4s. 10d. for the previous year, thus showing an increase of £6,743 12s. 9d.

The directors recommended the payment of a dividend of 6 per cent. on the ordinary shares.

The Vitamins Group

Reviewing the Group's progress at the annual meeting, Mr. H. C. H. Graves pointed out that the dividend of 3d. per share represented 2½ per cent. to shareholders who put up 10s. per share in 1929, although British Company Law and practice made them describe it as 25 per cent. because the shares were nominal 1s. shares. It was, in his view, unfortunate that the Cohen Committee had not accepted a proposal to introduce "no par value" shares on the American pattern, since this would avoid such misconceptions which harmed industrial relations every day.

Beecham Group

Referring to the acquisition of shares in food companies, Sir J. Stanley Holmes, M.P., chairman and managing director of the Beecham Group, Ltd., reminded shareholders at the annual general meeting held in London recently that last year they had acquired the equity of C. and E. Morton, Ltd., and that during the current year the shares of further food companies had been acquired at a total cost, including Morton's, of approximately £1,000,000. The purchase money had been found from their own cash resources, and they had registered a new company with a capital of £1,000,000, styled "Beecham Food Products, Ltd.," to which company the shares of all these food companies had been transferred. The shares in the new company were all held by Beecham Group, Ltd.

Continuing, the chairman said that through acquiring the companies there had been attracted to the Beecham Group a number of men who had great experience in the food trade, and therefore a food council had been formed comprising the executives of the various companies, which meets regularly and advises on the policy to be pursued. He was

confident that the organisation of this very important new enterprise was proceeding on the right lines.

Sir Stanley Holmes said that reference had been made last year to the fact that they had registered a company styled Beecham Research Laboratories, Ltd., and were building up a research department. A property had been purchased and the research department would be moving in at the beginning of October. Personnel had considerably increased since last year and now numbered 115, of which 34 are scientists of graduate status. In addition, a number of distinguished scientists have been added who will exclusively act as advisers.

The Beecham Group's present research investigations cover four main fields—food, pharmaceutical, veterinary, toilet and cosmetics—and at the present time the research department is carrying out work of one kind or another for every company operating in the Group.

Montgomerie and Co., Ltd.

At the annual general meeting of Montgomerie and Co., Ltd., Mr. J. D. Montgomerie, the chairman and managing director, presiding, said that the volume of turnover and ratio of profit in the various departments of the company during the year were satisfactory and resulted in the trading profit of £42,122. After making provisions of £5,000 for deferred repairs and £21,922 for taxation, there was an available profit of £15,200, compared with £7,623 for 1944-45. This arose from a more complete clarification of the taxation position, as, due to the complexities of group taxation, provisions in past years had proved to be more than sufficient. Adding the balance of profit carried forward and deducting the amount of dividends already paid, the sum of £24,061 was available for disposal, and the directors recommended the payment of a final dividend of 10 per cent., less tax, on the ordinary shares, making 15 per cent., less tax, for the year. They also recommended the further payment this year of a victory bonus of 10 per cent., less tax, on the ordinary shares, leaving £16,471 to be carried forward.

Overseas

Citric Acid for Eire

The first supplies of citric acid to be imported into Eire for about six years are expected to arrive shortly, and will be used in the manufacture of mineral waters, jams, and jellies in place of the substitutes which have had to be employed.

Citric acid has now been released from control by the Combined Food Board and, subject to currency regulations being complied with, manufacturers are free to import whatever quantities they may be able to secure.

New Fertiliser Discovery

A new bacterial fertiliser—phosphoro-bacterin—which intensifies the biochemical processes of the soil and markedly increases the harvest of all agricultural crops has been developed by the All-Union Research Institute of Agricultural Microbiology in Russia.

The use of phosphoro-bacterin in fertilising clay soil sown to barley on one collective farm increased the harvest by 4 cwt. per hectare (1 hectare equals 2½ acres). On another collective farm the barley harvest on a field fertilised with phosphoro-bacterin increased by 8 or 10 cwt. per hectare.

The Institute is now working on a new form of this bacterial preparation in the shape of a kaolin powder. Before sowing the seeds are soaked in a solution of this powder. Only 250 grams of the powder are required to fertilise 1 hectare.

Tartaric Acid

An essential ingredient in the manufacture of baking powder, health salts, confectionery, mineral waters, etc., tartaric acid is subject to international allocation in Eire, and for some years past the quantities made available to the country have been inappreciable in relation to full requirements. A substantial allocation has now been made, and it should be possible for all importers to obtain reasonable supplies. The acid may be purchased only in Spain or Italy.

New Type American Refrigerator

The General Electric Company of America is to build, under patent rights assigned to them, a refrigerator with ice cube freezer in a compartment separated from the food-cooling section. The freezing compartment at the top of the cabinet receives the full benefit of the mechanical refrigeration. The food compartment below, which is kept at a somewhat higher temperature (40° to 45° F.), has its own cooling coil, which is filled with a mixture of oil and an easily evaporated refrigerant of the Freon type. Extensions of this coil into the upper compartment are connected with a condenser that functions as a heat exchanger.

When the lower compartment tends to warm up, some of the refrigerant in its coil evaporates. The vapour rises into the heat exchanger, where it is condensed and recooled, flowing back into the food-cooling coil. It is claimed that the process is one of extreme simplicity and foolproof efficiency. —*Reuter's Trade Service.*

South African Food Canners

South African fruit, vegetable, and fish canners, who last year produced 141,000,000 tins of food, are viewing the future with apprehension.

Illustrating the tremendous expansion of this industry, the President of the South African Canners' Council pointed out at a recent meeting that the Union's output of tinned fish had, during the war years, increased proportionately to the decline in imports, until, in 1945, the Union industry had produced almost as much as was imported annually before the war. He urged canners to make a thorough study of the home market and to try to reduce prices to levels which this market could afford. — *Reuter's Trade Service.*

Refrigerator Car

Intended to be lighter and colder than the average frigidair car, the Illinois Central Railroad is assembling an experimental refrigerator car with an aluminium framework, fibre-glass insulation, and forced air circulation.

Irish Beet Sugar

The production of 95,000 tons for the year from the 82,619 acres under beet constituted a record, it was stated at the annual general meeting of the Irish Sugar Beet Growers' Association, Ltd., in Dublin recently.

This record was achieved despite the fact, according to Mr. J. Hughes, T.D., that no research had been undertaken by the Sugar Company to counteract disease in crops. Blackleg was prevalent, he said, and advocated a joint committee to deal with seed production.

Glucose Shipments

A substantial quantity of glucose for industrial use has been obtained in South America and is at present awaiting shipment to Eire from Buenos Aires.

Sweet manufacturers are the principal users of glucose for industrial purposes. In pre-war years these manufacturers used large quantities of imported glucose in the manufacture of various sweet lines. Supplies were extremely scarce during the greater part of the war period, and the scarcity was relieved by the provision of allocations of sugar in lieu of glucose when the latter could not be imported. Manufacturers were assisted in this manner to keep up their production of sweets and to maintain employment at a high level. Glucose is still in short supply and allocations of sugar in lieu are continued where that course is warranted.

Soviet Science

A survey of present-day development and future prospects of Soviet science, a short biography of the author, S. I. Vavilov, President of the Academy of Sciences of the U.S.S.R., and an outline of the history of the Academy are contained in a recently issued booklet, *Soviet Science in the Service of the People*, published by *Soviet News*.

The booklet, which is illustrated, also contains extracts from the statutes of the Academy, tables giving details about its branches and the new academies in the various republics, and a list of British and American members. The appendix deals with the Stalin prizes awarded for scientific achievements since 1939.

Oil-Seed Mission for West Africa

POSSIBLE HELP IN OVERCOMING WORLD FOOD SHORTAGE

The Secretary of State for the Colonies, Mr. George Hall, M.P., has appointed a mission consisting of the following members to investigate oil-seed production in West Africa:

Dr. B. A. Keen, D.Sc., F.R.S. (chairman), Assistant Director of the Rothamsted Experimental Station at Harpenden, Herts.

Mr. J. McFadyen, Director of the English and Scottish Joint Co-operative Wholesale Societies.

Mr. C. E. Rooke, C.M.G., formerly general manager of the Nigerian Railways.

Terms of reference of the mission are: To investigate and report, in consultation with the colonial governments concerned, on the possibilities of increasing, during the period of the immediate world food shortages, an exportable surplus of vegetable oils and oil seeds in West Africa; and to recommend means of securing maximum production of these commodities, including the provision of the necessary transport and other facilities for their speedy movement to the ocean ports.

Secretary of the mission, which left this country by air on August 19 for Nigeria, is Mr. R. S. Mallinson, of the Colonial Administrative Service, who until recently was Director of Supplies, Nigeria.

The mission's immediate field of investigation will be in Nigeria, and the question of visiting other West African territories will be decided in the light of information obtained during the Nigerian tour, which will cover the groundnut-growing area around Kano in the north and the palm-nut belt in the Eastern Province.

Frozen Foods in Ireland

Of great interest in the trade and industrial section of the Royal Dublin Society's August Horse Show was evidence of the start in Ireland of the processing and packing of frozen foods.

A company, Ever-Fresh Foods, Ltd., has been formed, working in close collaboration with Irish Cooling Equipment, Ltd., to process, pack, and market quick frozen fruits and vegetables. These will be marketed under the brand name "Golden Spring." Fruit and vegetables will be processed within a few hours of harvesting and will be available throughout the winter as fresh as when picked. The company's products are being specially grown.

Messrs. Batchelor and Co. (Ireland), Ltd., are also entering the quick frozen market and hope to expand from peas and other vegetables to fruit and meat.

Vegetable Fats in French Colonies

The world shortage of vegetable fats has been greatly increased as a result of the war. During the war France found that her own production only supplied one-third of requirements, and it was decided to encourage production so that in a few years an annual production of 300,000 tons of oleaginous fats would be available. North Africa is also unable to satisfy her own needs and has to import. Before the war 150,000 tons were consumed annually, of which one-third was used in food manufacture. Out of this figure 50,000 tons of vegetable oil was imported, 13,000 tons came from oleaginous plants in the country, and the rest was olive oil, a local production.

Since the war the best results have been registered in Morocco, which, except for olives, is richer in oleaginous resources than the rest of North Africa.

In world vegetable oil production peanuts occupy second place, and before the war the French colonies produced 825,000 tons, or almost 10 per cent. The extension of cultivation is at the moment held up by technical factors. Dahomey was the greatest exporter of palm oil, but there has been a steady decline in production.

Wexford Bacon Factory Changes Hands

At a meeting of shareholders of Wexford Bacon Factory, Ltd., it was decided to accept an offer by Clover Meats, Ltd., of Waterford, to take over the Wexford factory with its buildings, assets, and equipment. The Wexford factory will be wound up voluntarily. The Wexford shareholders will get one 10s. fully paid share in Clover Meats for every £2 they have paid into the Wexford factory, and 14,000 of these 10s. shares will be allotted to the Wexford shareholders.

In advising the shareholders to accept the proposals, the Wexford factory directors stated that adverse conditions under which the pig and bacon industry had been working for the past four or five years had resulted in a crisis which the directors had had to reckon with as a probable contingency. The factory had always been under-capitalised, and money for development was never available.

The report stated that from 1940 onwards there was an acute scarcity of pigs, while the selling price of bacon was controlled. Extreme competition among curers forced the price of pigs up to a level out of all proportion to the controlled price of bacon, and heavy trading losses were inevitable. The factory could not continue working without additional capital. The proposals of Clover Meats, Ltd., offered the only opportunity of preserving the existence of the factory in Wexford and of enabling it to afford the facilities and service to the shareholders whom it was established to serve.

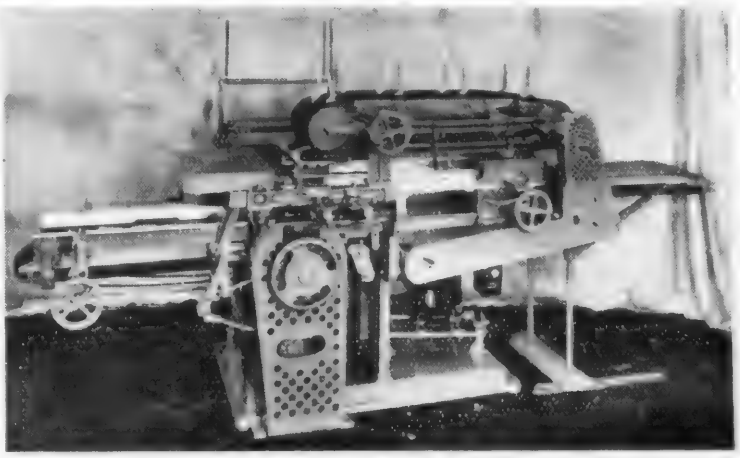
Clover Meats, Ltd., intend to continue working the Wexford factory, and probably to extend it later to include lines of business similar to those at Waterford.

Russian Sunflowers

More than 6,177,000 acres, mainly in the Ukraine and North Caucasus, have been planted with sunflowers to provide the Soviet Union with plant oil. Altogether about 2,470,000 acres more than last year have been sown with oil-producing plants in Kazakstan, Northern Caucasus, Central Asia, and the Ukraine.—*Reuter.*

American Food Packaging

DEVELOPMENTS IN AUTOMATIC WRAPPING MACHINE



An automatic wrapping machine which wraps and heat seals cartons, flat objects on a card, and banded goods such as paper envelopes is manufactured by the American Package Machinery Company.

It has an output of approximately 100 packages per minute, and the operation is performed without turning the package. This machine was first used to wrap fresh tomatoes in open boats, a method of packaging which has spread widely within a few years from Boston to the Pacific coast.

Because of the consumer reaction to this innovation, a new industry has grown up—that of pre-packaging fresh fruits and vegetables. Special machines now take cleaned and trimmed vegetables and package them in varied consumer-size open trays. These are supplied daily to big supermarkets and smaller grocery stores and displayed, all weighed and price-tagged, in refrigerated cases.

The company has completely redesigned this machine, its new model incorporating the latest technical improvements to give it greater versatility and more adjustable speeds. Mechanically the new model is stronger, quieter in operation, easier to supervise, and occupies less floor space.

Among the improvements are a new-type paper feed and glue pots that are easier to clean and permit the use of any type of glue or cellosolve. There are also new spring-floating heater units, a more sensitive paper stop that prevents light packages from tipping, a transport mechanism that permits shorter discharge belts, and a folding box which makes it easier to adapt the machine to any size package, making possible the wrapping of as many as ten different sizes of cracker cartons or other packages. Packages up to 12 in. in length, $5\frac{3}{8}$ in. in width, and $3\frac{1}{4}$ in. in thickness can be dealt with, and for larger packages special standard machine models are available.

Turkish Raisins

British firms are negotiating with Turkey for the export of raisins. British airline representatives have already got into touch with the Turkish Chamber of Commerce with regard to the export of Turkish fruit to Britain by air.—*Reuter.*

Agricultural Machinery

Equipped to handle repairs, maintenance work to machinery, and to manufacture industrial and agricultural machinery, the Department of Commerce and Industry in Ceylon plans to erect a factory as part of its post-war development plan.

Ministry News

Appointment

Mr. I. Graul, O.B.E., has been appointed Director of Fish Supplies, with effect from October 1, 1946.

Starch Food Powders

An improvement in the starch supply enabled the Ministry of Food as from September 1, 1946, to restore allocations of starch for starch food powders manufacture to the level at which they stood before May 1, 1946, when allocations had temporarily to be reduced.

Chocolate and Sugar Confectionery

An Order has been made, which came into force on August 15, 1946, amending the Chocolate, Sugar Confectionery, and Cocoa Products (Control and Maximum Prices) Order, 1944.

In order to help manufacturers to introduce greater variety into the production of sweets, the range of maximum prices for sugar confectionery is extended from 4s. to 5s. per lb., and for chocolate confectionery from 5s. to 6s. per lb. The higher prices will, as usual, be subject to the approval of the Minister.

The Order also provides that where the maximum retail price of chocolate or sugar confectionery involves a fraction of a farthing, such fraction shall be regarded as a whole farthing; and it makes certain alterations and additions to the list of medicated products which, while regarded as sugar confectionery, are not subject to personal points rationing.

Canned Meat and Meat Products

An Order which came into force on August 18, 1946, has been made replacing the Meat Products, Canned Soup, and Canned Meat (Control and Maximum Prices) Order, 1944, as amended.

The new Order is, in the main, a re-enactment of the Order it replaces, but it makes changes in the meat content and price of beef sausages, prescribes maximum prices for home-canned tongues and imported salami, and revises the price of imported canned sheeps' tongues.

The meat content of beef sausages and beef sausage meat, including beef slicing sausages, is being increased from 40 per cent. to a minimum of 50 per cent., the same standard of quality as for pork sausages. In consequence the maximum wholesale and retail prices for beef sausage meat, including beef slicing sausage, are being increased by 1d. per lb. Recent increases in the cost of casings have necessitated a slightly greater rise in the prices of beef sausages.

The increased cost of casings also affects pork sausages, but the price to the consumer will remain unchanged.

The canning of tongues in this country was discontinued during the war, and the limited supplies now available for allocation to canners will enable them to resume production on only a small scale. All sales will be against points, and points values for the home-packed tongues will be those at present in force for imported canned tongues.

Fisheries in War-Time

A report of the Ministry of Agriculture and Fisheries entitled Fisheries in War-Time is on sale at H.M. Stationery Office or from any bookseller, price 1s. 6d. net.

The last report on the Fisheries of England and Wales appeared in respect of the year 1938. The present report covers the years 1939-1944, both inclusive, and, in fact (except in the case of the statistical tables), carries the story up to the conclusion of hostilities in 1945. Normally the reports on the Fisheries of England and Wales appear in two parts, one being devoted entirely to statistical tables. On this occasion, as the report deals with several years, the statistical tables have necessarily had to be somewhat curtailed and are included with the rest of the report in one volume.

The report contains, of course, much that is peculiar to the war years, and includes chapters on matters that would not normally figure in one of these reports—*i.e.* the Effect of War on Fishing, Control of Fishing Operations, Fishermen at War, War Risk Insurance, Man Power Problems, Price Control, and Post-War Reconstruction. Chapters on subjects normally covered in the earlier reports, such as Review of Landings, Whaling, and Scientific Investigations, are also included, and it is hoped that, in the words of the preface, the contents of the report "may commend themselves, by the story they tell of the part played by an essential but unassuming section of the community, to an appreciative public."

Income Tax and Scientific Research

Organisations engaged upon agricultural and horticultural research, in common with those carrying out scientific research for the purposes of industry, are expected to benefit from the provisions of Part IV of the Finance Act, 1944, and Part VI of the Income Tax Act, 1945, which came into force on April 6, 1946.

Under the provisions of these two Acts, payments to approved research organisations made by agriculturists who are assessable to income tax under Schedule D will be chargeable as an expense in their accounts, even if the payment is intended as a contribution towards the cost of a definite capital project to be carried out by the organisation. This latter type of payment has not hitherto ranked as a permissible deduction for income-tax purposes.

In order to qualify for this relief as far as agricultural research is concerned, payments must be made to a research organisation that has been approved by the Agricultural Research Council. Applications by such organisations for approval should be sent to the Secretary, Agricultural Research Council, 6a, Dean's Yard, Westminster, London, S.W.1.

The terms of these two Acts also provide for the granting of allowances in respect of any expenditure on research that may be carried out privately by individual farmers or horticulturists. Further information on these points may be obtained from H.M. Inspector of Taxes.

Information and Advice

Information Supplied

B.1158. *Names of firms manufacturing sealing caps.* (Worcs.)

B.1159. *Firms specialising in small canning lines for soups and meat packs.* (Yorks.)

B.1160. *Suppliers of dehydration plant.* (Surrey.)

B.1161. *Manufacturers of sieves for sifting spices.* (New Zealand.)

B.1162. *Particulars of suppliers of machinery for the manufacture of wafers and cones.* (Yorks.)

B.1167. *Names of manufacturers of canteen equipment.* (South Africa.)

B.1172. *Names of firms manufacturing date spread.* (London.)

B.1173. *Particulars of manufacturers of* (1) *tinned meat, poultry, brawn;* (2) *cough cure;* (3) *health salts; and* (4) *ice cream powder.* (Glam.)

B.1174. *Manufacturers of machinery suitable for jellying meat pies.* (Lancs.)

B.1178. *Method of preventing the formation of mould on cooked skinned beetroots.* (Yorks.)

B.1181. *Titles, authors, and publishers of books dealing with commercial pickling, factory layout, and equipment.* (Yorks.)

B.1182. *Information regarding the production of 80 to 85 per cent. extraction flour.* (New Zealand.)

B.1185. *Literature dealing with the manufacture of jelly tablets.* (Eire.)

B.1186. *Names and addresses of suppliers of plant for the aerated water business.* (Scotland.)

B.1187. *Manufacturers of plant for making coffee extract.* (London.)

B.1188. *Suppliers of printed tags suitable for branding sausages.* (Eire.)

B.1189. *Names of suppliers of machinery for manufacturing small cartons from Norwegian board.* (Lincs.)

B.1191. *Firms supplying fishery salt outside Grimsby.* (Lancs.)

B.1192. *Information regarding suppliers of milk shake syrups and machinery for the manufacture of milk shakes.* (London.)

B.1196. *Names and addresses of firms specialising in the manufacture of machinery for grinding almonds.* (London.)

B.1197. *Details of the manufacture of apple rings.* (Eire.)

B.1198. *Names and addresses of manufacturers of steam fittings for boiling pans, tanks, sterilisers, etc.* (Lanark.)

B.1201. *Formula for ice cream powder, conforming to the Ministry of Food regulations.* (London.)

B.1202. *Information regarding the production of chewing-gum.* (Norway.)

B.1204. *Names and addresses of suppliers of ice cream churns.* (Singapore.)

B.1205. *Names and addresses of suppliers of essences and of manufacturers of filling machines.* (Eire.)

B.1206. *Recipes and processes for the manufacture of Worcestershire sauce and French mustard.* (Warwick.)

B.1209. *Details of manufacturers of the Erickson pie-making machine.* (Lanark.)

B.1210. *Names of suppliers of casein glue powder.* (Finland.)

B.1211. *Literature dealing with jam manufacture.* (N. Ireland.)

B.1212. *Method of preventing peeled potatoes from blackening.* (Dorset.)

B.1213. *Recipe for the manufacture of piccalilli.* (South Africa.)

B.1215. *Names and addresses of manufacturers of soapless cleansers.* (Eire.)

B.1216. *Firms supplying labelling machinery suitable for all round side labels.* (New Zealand.)

B.1217. *Names and addresses of suppliers of gelatine.* (Eire.)

B.1218. *Literature dealing with the processing of peanuts for the manufacture of peanut butter.* (Lancs.)

B.1219. *Names and addresses of British manufacturers of biscuits and jams.* (Egypt.)

B.1220. *List of suppliers of fish pastes.* (Lincs.)

B.1221. *Firms specialising in the manufacture of food apparatus and food research equipment.* (Poland.)

B.1223. *Details of firms manufacturing tables used in packing foodstuffs.* (Devon.)

B.1225. *Manufacturers of machinery for bundling cases* (1) *with iron bundle strips, and* (2) *with iron, steel, or mild steel wires.* (Egypt.)

B.1227. *Information regarding suppliers of machinery for packing syrup into tins and bottles.* (Lancs.)

B.1,228. *Suppliers of automatic or semi-automatic filling machines.* (Australia.)

B.1,229. *Suppliers of fruit and berry flavours in powder form suitable for the manufacture of beverage powders.* (London.)

B.1,237. *Names and addresses of firms manufacturing tablet packing machines.* (Suffolk.)

B.1,238. *Literature dealing with and manufacturers of antioxidants for edible fats.* (London.)

B.1,239. *Suppliers of gravity rolling conveyors.* (Eire.)

B.1,241. *Information regarding malt extract.* (Yorks.)

B.1,243. *Details of manufacturers of bottle washing machines.* (Herts.)

B.1,245. *Information as to the use of triethanolamine stearate as an emulsifier in food products.* (Lancs.)

B.1,250. *Particulars of direct suppliers of groats, oatmeal, and barley.* (Lancs.)

Information Required

B.1,303. *Supplies of blood plasma and blood albumen are available; manufacturers who are interested may obtain details by applying to* FOOD MANUFACTURE. (London.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents," and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

577,688. ROBINSON, E. K., and BAGNALL, J.: Paper bags and manufacture thereof.
577,838. JOY MANUFACTURING CO.: Loading machines.
577,915. BRAGAZZI, L.: Machine for cutting potatoes into chips.
577,962. STOVES, LTD., and RYDER, S. E. A.: Cooking stoves having thermostatic control devices.
577,994. CLEVELAND, F. J. (Granular Foods Inc.): Expanded solid corn syrup products.
578,078. NYROP, J. E.: Methods of preparing cocoa and chocolate products.
578,220. DEHN, F. B. (Chain Belt Co.): Grinding mill.
578,221. SIVLEY, G. A., and REICH, E.: Cooking devices.
578,244. BAKER PERKINS, LTD., CARR AND CO., LTD., and TATE, J. M.: Means for facilitating the discharge of baked biscuits from a travelling wire mesh band.
578,327. HENRY, A.: Pot, incorporating a whisking device, for preparing cocoa and other beverages.
578,355. CURRAN AND CO., LTD., E., CURRAN, J., and HICKS, S.: Apparatus for removing the peel or skin from potatoes and the like.
578,387. BURGESS, A. F. (Wincharger Corporation): Refrigerator cars.
578,469. KULA, W.: Tea infusers.

Abstracts of Recent Specifications

Topping Machine for Canning

This invention relates to a topping machine for use in the commercial packaging or canning of food materials and the like, its purpose being to depress or push the material down within the packing receptacle or can to a location below the upper rim of the can, and provide a suitable head space, preliminary to the placing of the closure or cover upon the can. Accordingly, it is adapted to be employed in the canning line between the filler, which places the material in the cans, and the closure applying device which places the closures upon them.

In order to fit properly into the canning procedure without interrupting or retarding the progress thereof, it is essential that the topping operation be accomplished quite expeditiously and while the cans are moving progressively at the normal rate at which the line is operated.

Many commodities, peeled fruits for example, are of tender or delicate structure and may be crushed, bruised or mutilated by pressure if their movement downwardly in the can under the pressure is resisted. Such is likely to occur when the pressure is applied more rapidly than the pieces of fruit are able to move freely.

The invention may be described as pertaining to that type of machine in which the contents of containers are compressed while the containers are travelling at constant speed serially in a predetermined path. The machine provides means for guiding the plunger in the vertical orbit in such manner that the curvature of the portion of the orbit below its horizontal axis is less than the curvature of the portion above said axis, with the effect that the operative relation between plunger and container is established more gradually and maintained over a longer period of time than in prior machines. In spite of the travel of the plungers in the vertical orbit, the plungers are, however, maintained constantly at the same angular relationship to the path of the containers.

575,483. *Lynn Eugene Davies.*

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

CHALLENGE.—637,367. Coffee. **Nichols and Co. (Sheffield), Ltd.,** Shalesmoor, Sheffield, 3; Manufacturers and Merchants.

SUNDEW.—637,369. Cheese. **Bel Cheese, Ltd.,** Princes Street, Northam, Southampton; Manufacturers and Merchants.

NEDIKO.—637,778. Tea. **George Hill and Co. (Stockton), Ltd.,** 14, Prince Regent Street, Stockton-on-Tees; Merchants.

TABLE TALK.—637,841. Ice cream and ice cream mixtures. **Towers Creameries, Ltd.,** Towers Factory, Commonside East, Mitcham, Surrey; Manufacturers and Merchants.

DAWN.—637,849. Confectionery (not medicated). **James Pascall, Ltd.,** Furzedown Works, Streatham Road, Mitcham, Surrey; Manufacturers.

PIN UP.—637,866. Chocolate and sugar confectionery (not medicated). **G. F. Lovell and Co., Ltd.,** Rexville, Albany Street, Crindau, Newport, Mon.; Manufacturers and Exporters.

BISCUIT BLOOM.—637,939. Flour. **Frank Louis Stollery,** Waynefleete, 12, Quilter Road, Felixstowe, Suffolk; Merchant.

New Companies

Goldstor, Limited. (407801.) River Plate House, Finsbury Circus, E.C.2. To manufacture, repair, and deal in refrigerators, freezers, coolers, etc. Nom. cap.: £5,000 in 5,000 stock units of £1 each. Dirs.: L. Knifton, 33, Grove Avenue, Muswell Hill, N.10; G. W. Parker, 24, Delta Court, Coles Green Road, N.W.2; S. D. Stuart, 40, Neville Court, Dollis Hill Lane, N.W.2.

Warwick (Scarborough), Limited. (407873.) To take over business of chocolate manufacture and sugar confectionery formerly carried on as "John Warwick and Co.," at York and Tadcaster. Nom. cap.: £1,000 in £1 shares. Dirs.: not named. Subs.: Helen J. Foster, Orchard House, Patrington, E. Yorks (clk.); J. Snell, 299, Marfleet Lane, Hull (clk.).

W. A. Latter, Limited. (414439.) 4, Dudley Road, Tunbridge Wells. To take over bus. of baker and ice cream manufacturer carried on as "W. A. Latter" at 104a, Vale Road, Tonbridge, and 15b, Church Road, Southborough. Nom. cap.: £1,000 in £1 shares. Dirs.: W. A. Latter (permt. mang. dir. and ch.); and Daisy M. Latter, The Hectorage, Tonbridge, Kent.

E.S.M.A.G., Limited. (414542.) Warnford Court, Throgmorton Street, E.C.2. To carry on bus. of importers, exporters, and manufacturers of and dealers in chocolate, sweets, confectionery, tea, coffee, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: to be appointed by subs. Subs.: P. J. A. Sapicha, 71m, Park Street, W.1.; Z. A. Maliszcedski, 75, Compayne Gardens, N.W.6.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.